

Draft: For Internal Review Only

Arizona Department of Environmental Quality

Antidegradation Implementation Procedures



June 2004

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Glossary

Alternatives Analysis: An evaluation of possible cost-effective, reasonable alternatives to new or expanded regulated activities that might degrade water quality, including less-degrading alternatives, non-degrading alternatives, and no-discharge alternatives, such as treatment process changes, relocated discharge facilities, land application, and subsurface discharges. The evaluation must provide substantive information pertaining to the cost and environmental impacts associated with the proposed activity and the alternatives being evaluated, so that the most cost-effective, reasonable, and least degrading approach for addressing impacts from the proposed activity can be identified.

Antidegradation: A statutory policy and implementation procedure adopted by regulatory authorities to protect existing waterbody uses and prevent water quality from deteriorating unless some defined public benefit is realized from lowering water quality and a minimum level of waterbody protection is maintained.

Arizona Pollutant Discharge Elimination System: The State of Arizona's point source discharge permit program established pursuant to §402 of the Clean Water Act [33 U.S.C. §1342].

Assimilative Capacity: The ability of a waterbody to receive, process by mixing, or otherwise assimilate quantities of a pollutant up to the point at which the waterbody violates the water quality criterion for that pollutant.

Available Assimilative Capacity: The difference between pollutant quantities or loads in a waterbody as characterized by baseline (existing) water quality and the projected or modeled water quality criteria threshold for the pollutant under review; the concentration increment between the existing (baseline) water quality and the water quality criterion for any pollutant.

Baseline Water Quality: A characterization of selected chemical, physical, and/or biological parameters or conditions of a waterbody as measured and expressed during a specified time period. Once established, baseline water quality is a fixed quantity/quality unless it is updated to reflect improvements in water quality parameters.

Degradation: A decline in the chemical, physical, or biological conditions of a waterbody or other decline in water quality as measured parameter-by-parameter. Degradation can be measured by the percent change in ambient concentrations predicted at the appropriate critical condition(s), the percent change in loadings (i.e., the new or expanded loadings compared to total existing loadings to the segment); the percent reduction in available assimilative capacity; the nature, persistence, and potential effects of the parameter; and the potential for cumulative effects.

Designated Use: A waterbody use specified by ADEQ, including those categories specified in R18-11-104. These uses include domestic water source, full-body contact (recreation), partial body contact (recreation), fish consumption, aquatic and wildlife (cold water), aquatic and wildlife (warm water), aquatic and wildlife (ephemeral), aquatic and wildlife (effluent dependent waters), agricultural irrigation, and agricultural livestock watering. Designated uses are accompanied by established water quality criteria that describe numeric or narrative benchmarks designed to ensure that the designated uses are achievable. Designated uses are to be adopted or removed by rule, and are subject to numeric and narrative water quality standards prescribed by the rule. As is the case nationally, if surface water has more than one designated use, the most stringent water quality criterion applies.

Effluent-Dependent Water: Surface water that consists of discharges of treated wastewater that is classified as effluent-dependent water by the Director under R18-11-113. Effluent-dependent

water is surface water that, without the discharge of treated wastewater, would be ephemeral water.

Ephemeral Water: A surface water that has a channel that is at all times above the water table, and that flows only in direct response to precipitation.

Existing Uses: Those uses of a waterbody that have actually occurred in the waterbody since November 28, 1975, or those uses supported by water quality at any time since that date, whether or not the uses are included as designated uses.

Existing Water Quality: Baseline water quality.

High Quality Water: A waterbody with water quality that is better than the applicable water quality criteria for any chemical, physical, or biological parameter.

Intermittent Surface Water: Surface water, which, at times of the year, receives water from a spring or from another source such as melting snow.

Less-Degrading Alternative: A cost-effective, reasonable alternative to a proposed new or expanded and potentially degrading activity that would result in fewer detrimental changes to parameters characterized by the baseline water quality assessment.

Limited Degradation: A deterioration or decline in water quality that results in the consumption of some portion of a waterbody's available assimilative capacity for any pollutant or parameter.

National Pollutant Discharge Elimination System: The point source discharge permit program established by § 402 of the Clean Water Act [33 U.S.C. § 1342].

Non-Degrading Alternative: A cost-effective, reasonable alternative to a proposed new or expanded and potentially degrading activity that would result in no significant changes to parameters characterized by the baseline water quality assessment.

Perennial Surface Water: A waterbody lying or flowing upon the surface of the land that flows continuously throughout the year.

Pollutant: Fluids, contaminants, toxic wastes, toxic pollutants, dredged spoil, solid waste, substances and chemicals, pesticides, herbicides, fertilizers and other agricultural chemicals, incinerator residue, sewage, garbage, sewage sludge, munitions, petroleum products, chemical wastes, biological materials, radioactive materials, heat, wrecked or discarded equipment, rock, sand, cellar dirt, and mining, industrial, municipal, and agricultural wastes or any other liquid, solid, gaseous, or hazardous substance.

Regulated Activity: Any activity that requires a permit or a water quality certification pursuant to a state or federal law (e.g., CWA §402 AZPDES permits, CWA§404 Dredge and Fill Permits, any activity requiring a CWA§401 certification), any activity subject to nonpoint source control requirements or regulations, and any activity which is otherwise subject to state regulations that specify that the antidegradation review process is applicable.

Short-Term Degradation: Degradation that is six months or less in duration, i.e., water quality returns to pre-activity levels within six months after the project commences.

Significant Degradation: The consumption of 10 percent or more of a waterbody's available assimilative capacity for any pollutant or parameter.

Surface Water: A water of the United States, including the following:

- a. A water that is currently used, was used in the past, or may be susceptible to use in interstate or foreign commerce;
- b. An interstate water, including an interstate wetland;

- c. All other waters, such as an intrastate lake, reservoir, natural pond, river, stream (including an intermittent or ephemeral stream), creek, wash, draw, mudflat, sandflat, wetland, slough, backwater, prairie pothole, wet meadow, or playa lake, the use, degradation, or destruction of which would affect or could affect interstate or foreign commerce, including any such water:
 - i. That is or could be used by interstate or foreign travelers for recreational or other purposes;
 - ii. From which fish or shellfish are or could be taken and sold in interstate or foreign commerce; or
 - iii. That is used or could be used for industrial purposes by industries in interstate or foreign commerce;
- d. An impoundment of a surface water as defined by this definition;
- e. A tributary of a surface water identified in subsections (a) through (d) of this definition; and
- f. A wetland adjacent to surface water identified in subsections (a) through (e) of this definition.

Temporary Degradation: Degradation that is six months or less in duration, i.e., water quality returns to pre-activity levels within six months after the project commences; short-term degradation.

Tier 1 Protection: Policies and procedures that prohibit degradation which results in the loss of an existing waterbody use, or violation of water quality criteria; and prohibit degradation of existing water quality where parameters of concern do not meet applicable water quality standards. Tier 1 protection applies to all surface waters regardless of existing water quality as the minimum protection level. Tier 1 protection categorically applies to all non-perennial waterbodies (i.e., all intermittent streams, ephemeral waters, and effluent dependent waters), all canals, and all water segments on the state's 303(d) impaired waters list for the parameters that resulted in the segment being listed.

Tier 2 Protection: Policies and procedures that prohibit significant degradation of a waterbody unless a review of reasonable alternatives and social and economic considerations justifies a lowering of water quality. Tier 2 protection level applies to perennial waterbodies for parameters reflecting high quality water (i.e., all parameters that are better than minimal water quality criteria or standards).

Tier 3 Protection: Policies and procedures that prohibit any lowering of water quality in unique waters as identified under R18-11-112 unless it is short-term and minimal, as determined by the Director of ADEQ on a case-by-case basis.

Toxic: A pollutant or combination of pollutants which, after discharge and upon exposure, ingestion, inhalation, or assimilation into an organism, either directly from the environment or indirectly by ingestion through food chains, may cause death, disease, behavioral abnormalities, cancer, genetic mutations, physiological malfunctions (including malfunctions in reproduction), or physical deformations in the organism or its offspring.

Unique Water: Surface water that is classified as outstanding state resource water by the AZ ADEQ Director under R18-11-112.

Water Quality Criteria: Elements of water quality standards that are expressed as pollutant concentrations, levels, or narrative statements representing a water quality that supports a designated use.

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1 Overview of Arizona's Antidegradation Approach

*Summary of Clean Water Act and State Water Quality Requirements
Uses and Water Quality Criteria
Review of Tier-Based Anti-Degradation Approach
Coverage and General Applicability
Coordination with 305(b) Assessment and 303(d) Listing
Intergovernmental Coordination and Review Process
Public Notification and Participation*

This document has been issued to provide guidance to persons conducting regulated activities that have the potential to degrade water quality in Arizona. Such activities include those that require a permit or a water quality certification pursuant to state or federal law, any activity subject to nonpoint source regulations, and any activity which is otherwise subject to state requirements and regulations that protect water quality. The information contained in this document is intended to provide guidance only, and is not a substitute for the provisions of any other laws, rules, or regulations.

While this document provides guidance for most activities that might degrade water quality, it is not feasible to predict all possible situations, conditions, and actions that might be subject to an antidegradation review. In the event that this guidance does not provide a clear indication of how an antidegradation review is to be conducted – or whether or not an antidegradation review is warranted – the Director of the Arizona Department of Environmental Quality (ADEQ) will make such determinations.

1.1 SUMMARY OF CLEAN WATER ACT AND STATE WATER QUALITY REQUIREMENTS

The guidance that follows addresses implementation procedures for Arizona's Antidegradation Rule found at A.A.C. 18-11-107, as related to the federal rules posted at 40 CFR §131.12. The guidance generally includes:

- ◆ Processes for identifying the antidegradation protection level (i.e., the “*tier*”) applied to parameters of concern in a surface water;
- ◆ Procedures for determining existing or baseline water quality (BWQ);
- ◆ Approaches for assessing water quality degradation associated with human activities;
- ◆ Processes for identifying and assessing less degrading or non-degrading alternatives;
- ◆ Procedures for determining the importance of economic or social development;
- ◆ Information on the antidegradation review, intergovernmental coordination, and public participation processes.

1.2 USES AND WATER QUALITY CRITERIA

Water quality standards, including designated uses and associated water quality criteria can be found in A.A.C. Title 18 Chapter 11, Article 1. Under the Clean Water Act and Arizona's rules, existing uses are recognized and designated uses are assigned to surface waters, such as recreation, domestic water source, fish consumption, aquatic and wildlife support, agricultural

irrigation, and livestock watering (See A.A.C. R18-11-104). Uses may vary in a surface water or lake/reservoir, and may change at various locations. Some waterbody segments may have more than one designated, or existing, use. Where more than one use exists, or has been designated for a surface water, the use with the most stringent water quality requirements must be maintained and protected.

Existing and Designated Uses

Existing uses are those uses that have actually occurred in a waterbody since November 28, 1975, or those uses supported by water quality at any time since that date, whether or not the uses are included as designated uses. The antidegradation rules require ADEQ to evaluate and protect existing uses and the level of water quality necessary to protect the existing uses. Existing uses will be determined by ADEQ based on analysis of the uses attained or supported since November 28, 1975. The applicant will provide information regarding existing uses in the waterbody or stream segment as part of the antidegradation review. The permit writer will evaluate information provided by the applicant and other available information to determine existing uses.

Designated uses are established by ADEQ and include those categories established in R18-11-104. These uses include domestic water source, full-body contact (recreation), partial-body contact (recreation), fish consumption, aquatic and wildlife (cold water), aquatic and wildlife (warm water), aquatic and wildlife (ephemeral), aquatic and wildlife (effluent dependent waters), agricultural irrigation, and agricultural livestock watering. Designated uses are accompanied by an established set of *water quality criteria* that describe numeric or narrative benchmarks designed to ensure that the designated uses are achievable. In accordance with state regulations, designated uses can be established or changed only through administrative rulemaking.

1.3 REVIEW OF THE TIER-BASED ANTIDEGRADATION APPROACH

Federal and state law requires that surface waters be protected from activities that might degrade water quality. To implement this requirement, it is necessary to identify protection levels appropriate to each surface water and for each parameter of concern. The protection tiers assigned in Arizona are applied on a parameter-by-parameter basis, i.e., increased concentrations of any pollutant, or deterioration of narratively described water quality parameters will be defined as degradation. Under this approach, water quality might degrade for one or more parameters of concern but be unaffected for other parameters. Degradation may be further described as minimal (little or no change in any parameter of concern), significant (consumption of 10 percent or more of the assimilative capacity for a particular parameter), or serious (degradation causing a violation of water quality criteria or loss of existing use). Minimal degradation is permitted under the antidegradation rule and does not trigger comprehensive Tier 2 antidegradation review requirements. Significant degradation triggers the antidegradation requirements described in Tier 2 below. Serious degradation is prohibited by all tiers of the antidegradation rule. The tiered protection levels will be applied as follows:

Tier 1 –Applies to all surface waters as the minimum level of protection, and requires that the level of water quality necessary to protect the existing uses be maintained and protected. ADEQ interprets this as requiring that water quality standards be achieved; prohibits degradation of existing water quality where parameters of concern do not meet applicable water quality standards; applies as the default protection level for intermittent and ephemeral waters, effluent dependent waters, canals and impaired waters on the §303(d) list for the parameters that resulted in the surface water being listed.

Tier 2 – applies to high quality, perennial surface waters, i.e., where the level of existing water quality is better than applicable water quality standards; requires that existing water quality be maintained, but allows limited degradation. Prohibits significant degradation, unless a review of reasonable alternatives and social and economic considerations justifies a lowering of water quality. Tier 2 is the default protection level for perennial waters

Tier 3 – Applies to unique waters as identified under R18-11-112; prohibits any lowering of water quality unless it is short-term, as determined by the Director of ADEQ on a case-by-case basis.

Where a perennial surface water is listed on the state's 303(d) impaired waters list for one or more parameters, and where existing water quality for other parameters is better than water quality standards, the surface water will be afforded Tier 1 and Tier 2 protection on a parameter-by-parameter basis; i.e., Tier 1 protection for the parameters not meeting water quality standards, and Tier 2 protection for parameters that are equal to or better than water quality standards. Tier 3 protection will be afforded to all parameters on a unique water. **Where a perennial waterbody has not been listed as an impaired water or as a unique water, the presumed antidegradation protection level is Tier 2 for all parameters of concern.**

For Tier 2 protection, determinations regarding the significance of degradation are based on existing (baseline) water quality (BWQ) and the relative change in water quality projected to result from the activity under review. In general, BWQ, as discussed in Chapter 4, defines existing water quality for the purpose of antidegradation reviews. BWQ can be established for perennial surface waters through sampling and assessments conducted by ADEQ, certain regulated entities, or others. It is important to note that BWQ for any surface water may be reevaluated if monitoring indicates a general trend towards water quality improvement.

It is important to understand that existing (or baseline) water quality is a fixed quality/quantity. When a perennial surface water is characterized for the purposes of establishing baseline water quality (BWQ), that characterization will serve as the point of reference for future antidegradation reviews for that surface water unless BWQ is updated to reflect improvements in water quality. In addition, the allowance for up to a 10 percent reduction in assimilative capacity for any parameter of concern is calculated from BWQ, not ambient water quality at the time a project application is submitted to ADEQ. If ADEQ allows depletion of the 10 percent portion of assimilative capacity, that capacity is not available for subsequent activities. In that case, a new activity would be required to conduct an alternatives analysis and demonstrate "important economic or social development" if allowances were sought to further reduce assimilative capacity. If such demonstrations are made, ADEQ may allow consumption of additional assimilative capacity as long as intergovernmental and public participation processes are followed and water quality standards are not violated. Degradation is generally assumed to be significant if the activity results in the reduction of a waterbody's *assimilative capacity* for any parameter of concern by 10 percent or more during critical flow conditions. If the level of degradation is estimated to be less than 10 percent – i.e., not significant – and existing uses are maintained, the antidegradation review process is complete and the applicant proceeds with permitting. Details on the antidegradation review process for waters protected under each tier – including parameter-by-parameter degradation assessment, alternatives analysis, and social and economic impacts evaluation – are outlined in the following chapters. Appendix A, Antidegradation Review Flow Chart, provides an overview of the Tier 1, 2, and 3 review processes.

1.4 COVERAGE AND GENERAL APPLICABILITY

General Coverage

In general, the antidegradation implementation procedures described in this guidance apply to new or expanded regulated activities that have the potential to affect water quality. These activities include point source discharges regulated under the *Arizona Pollutant Discharge Elimination System* (AZPDES) permit program; activities which result in the placement of dredged or fill material into the waters of the state regulated under §404 of the Clean Water Act; activities regulated under federal permits and licenses that are subject to state water quality certification under §401 of the Clean Water Act; and other regulated activities, both point and nonpoint sources, which can degrade water quality.

Nonpoint Source Coverage

Nonpoint source (NPS) activities are not exempt from antidegradation requirements. 40 CFR § 131.12(9) clearly requires imposition of appropriate NPS controls to maintain and protect existing water quality for Tier 2 protection. Also, degradation is conditioned upon a state's determination that allowing a lower water quality is necessary to accommodate important economic or social development in the area.

In March 1994, US EPA transmitted guidance regarding nonpoint sources and the antidegradation provisions of the Water Quality Standards, with clarifying remarks for antidegradation implementation. US EPA's regulatory interpretation of 40 CFR §131.12(a)(2) is that it does not require a state to establish best management practices (BMPs) for nonpoint sources where such BMP requirements do not exist. The Act leaves it to the states to determine what, if any, controls on nonpoint sources are needed to provide for attainment of state water quality standards. States may adopt enforceable requirements, or voluntary programs to address nonpoint sources of pollution. 40 CFR §131.12(a)(2) does not require that states adopt or implement best management practices for nonpoint sources prior to allowing point source degradation of high quality water. However, states that have adopted nonpoint source controls must assure that such controls are properly implemented before authorization is granted to allow point source degradation of water quality. US EPA also interprets 40 CFR §131.12(a) as prohibiting point source degradation as unnecessary to accommodate important economic and social development if it could be partially, or completely, prevented through implementation of existing state-required BMPs.

The US EPA March 1994 guidance further states that:

Water quality standards are applicable to all waters and in all situations, regardless of activity or source of degradation. Implementation of those standards may not be possible in all circumstances; in such cases, the use attainability analysis may be employed. In describing the desired condition of the environment, standards establish a benchmark against which all activities, which might affect that desired condition, are, at minimum, evaluated. Standards serve as the basis for water quality monitoring and there is value in identifying the source and cause of the exceedance even if, at present, these sources of impact are not regulated or otherwise controlled. It is acceptable for a state to specify particular classes of activities for which no control requirements have been established in state law. It is not acceptable, however, to specify that standards do not apply to particular classes of activities.

Pursuant to this guidance, nonpoint sources of water pollution are addressed by the Arizona antidegradation policy and implementation procedures, particularly where those sources are subject to permitting or otherwise regulated. To ensure compliance, nonpoint source activities must demonstrate that cost-effective and reasonable BMPs have been appropriately selected, installed, and maintained.

Generally, if nonpoint source activities comply with the conditions or BMPs noted in their respective individual or general permit, they are presumed to meet antidegradation requirements and no detailed antidegradation assessment is required. For example, if a county requires erosion and sediment controls for construction sites of less than one acre, activities regulated by this policy will be deemed to be in compliance with antidegradation provisions if prescribed erosion and sediment controls are implemented and maintained. The level of antidegradation review required will depend upon the uses of the water segment that would be affected, the level of protection (i.e., tier) assigned to the applicable water segment and/or parameter of concern, the nature of the activity, and the extent to which water quality would be degraded.

The table on the following page summarizes the antidegradation review approach used in Arizona, which is based on the type of regulated activity under consideration (e.g., by permit type), the receiving water, and the baseline water quality for relevant parameters in the receiving water.

Table 1-1. Summary of Arizona Antidegradation Permit Review Procedure – Applicable to All New or Expanded Activities

Type of Permit:	Individual Arizona Pollutant Discharge Elimination System Permits			General AZ PDES Permits		404 Permits & 401 Certifications	
Receiving Water:	Ephemeral Waters Intermittent Streams Effluent Dependent Waters	Perennial Streams, Rivers, and Lakes	All Waters	All Waters	Unique Waters	All Waters	Unique Waters
Antidegradation Requirements:	<p>Meet effluent/discharge standards composited from:</p> <ul style="list-style-type: none"> WQ Criteria Technology-Based Standards (e.g., BAT) <p>Must not cause violation of WQ Standards</p> <p>No BWQ determination</p>	<p>Establish Baseline Water Quality using:</p> <ul style="list-style-type: none"> Existing Ambient WQ and/or Effluent Data New Credible Data <p>Must not cause violation of WQ Standards</p> <p>If BWQ parameters are equal to or better than WQ Standards, cannot consume 10% or more of the available pollutant assimilative capacity except under certain conditions (see below)</p>	<p>Meet requirements based on individual AZ ADEQ antidegradation review</p> <p>Must not cause violation of WQ Standards</p> <p>Must protect existing uses</p>	<p>Requirements established at the time of permit renewal.</p> <p>Compliance with BMPs stipulated by general permit conditions and/or 401 certification</p> <p>Must not cause violation of WQ Standards</p> <p>Must protect existing uses</p>	<p>No degradation allowed unless it is short-term</p> <p>Must not cause violation of WQ Standards</p>	<p>Antidegradation assessment conducted during 401 certification of nationwide and individual permits</p> <p>Requirements of nationwide permit established at time of permit renewal</p> <p>Compliance with BMPs stipulated by permit and 401 certification</p> <p>401 certification of individual 404 permits based on 401(b)(1) guidelines</p>	<p>No degradation allowed unless it is short-term</p> <p>Must not cause violation of WQ Standards</p> <p>Must protect existing uses</p>
Additional Requirements:		<p>If consuming $\geq 10\%$ of assimilative capacity, must conduct alternatives analysis and demonstrate that proposed project accommodates important economic or social development; public and inter-governmental input required.</p>	<p>Analysis of alternatives may be required; no degradation of unique waters allowed unless it is short-term</p>	<p>Analysis of alternatives may be required; no degradation of unique waters allowed unless it is short-term</p>		<p>Must not cause violation of WQ Criteria; no degradation of unique waters allowed unless it is short-term and minimal</p>	

*Includes permits and regulatory programs applicable to regulated activities that have a clear potential to degrade water quality.

1.5 COORDINATION WITH 305(B) ASSESSMENT AND 303(D) LISTING

Section 305(b) of the federal Clean Water Act requires each state to prepare and submit to U.S. Environmental Protection Agency (US EPA) a biennial report describing water quality of all surface waters in the state. Each state must monitor water quality and review available data to determine if water quality standards are being met. From the § 305(b) report, the § 303(d) list is created which identifies those streams that do not meet one or more designated uses. These waters are known as *water quality limited waters* or *impaired waters*. Identification of a water as impaired may be based on an exceedance of a numeric or narrative water quality standard.

To coordinate antidegradation reviews with the § 305(b) and § 303(d) listing process, ADEQ will implement the following procedures:

- ◆ *Tier 1 Protection (applicable to all waters):* No further degradation of existing water quality is permitted in a surface water where the existing water quality does not meet applicable water quality standards. Such impaired waters are identified on Arizona's §303(d) List and targeted for future Total Maximum Daily Load (TMDL) development.
- ◆ *Tier 2 Protection:* There will be no §303(d) listings based on Tier 2 antidegradation review. If the §305(b) assessment shows that significant degradation of a waterbody is occurring, but water quality standards have not been violated, ADEQ may conduct a special study of the extent and source(s) of degradation to determine likely trends and explore possible antidegradation actions. Where possible, ADEQ may develop an action plan and/or requirements for halting and reversing such degradation by providing technical, and other, assistance to probable sources of degradation to implement appropriate management practices, awarding priority points for grant or other funding programs targeted at water quality protection, amending permits or water quality certification conditions, and working with stakeholders to support actions needed to protect and restore water quality.
- ◆ *Tier 3 Protection:* No degradation is allowed in the unique waters afforded Tier 3 protection. If the §305(b) assessment shows that any degradation of such a waterbody is occurring, ADEQ may conduct a special study of the extent and source(s) of degradation to determine likely trends and explore possible antidegradation actions. Where possible, ADEQ may develop an action plan and/or requirements for halting and reversing such degradation by providing technical and other assistance to probable sources of degradation to implement appropriate management practices, awarding priority points for grant or other funding programs targeted at water quality protection, amending permits or water quality certification conditions, and working with stakeholders to support actions needed to protect and restore water quality. There will be no §303(d) listings based on Tier 3 antidegradation review.

1.6 INTERGOVERNMENTAL COORDINATION AND REVIEW PROCESS

Federal and state regulations require intergovernmental coordination and public participation for Tier 2 reviews and public participation in decisions that may result in water quality degradation. Coordinating antidegradation reviews among various agencies and other interested parties will involve significant cooperation in gathering data, conducting assessments, analyzing alternatives and evaluating potential social and economic impacts. A list of agencies that may be involved in the intergovernmental coordination and review process is included as Appendix E of this document.

Where applicable and practical, the antidegradation review procedure will be integrated into and proceed concurrently with existing environmental reviews pursuant to the issuance of AZPDES permits, Clean Water Act Section 404 permits, state water quality certifications issued under Section 401 of the Clean Water Act, and other regulatory programs. Information contained within existing environmental reviews, such as environmental assessments, environmental impact statements, facilities plans, and findings of no significant impact may be used to provide part or all of the requirements of the antidegradation procedure and review.

Persons proposing new or expanded activities that might degrade water quality are encouraged to notify ADEQ before determining baseline water quality or applying for a permit. Implementation of Arizona's antidegradation policy will require considerable consultation, coordination, and cooperation to ensure that relevant issues are addressed early in the review process. For Tier 2 assessments on perennial waterbodies, determining BWQ, assessing projected impacts, analyzing possible alternatives, and evaluating economic or social benefits, if applicable, must occur prior to issuing an individual permit. Therefore, it is recommended that an applicant discharging into a perennial waterbody meet with ADEQ in a pre-application conference at least two years prior to permit issuance. Timely notification and consultation will help ensure that the issuance of permits can proceed without disruption to facility design, construction, or other activities planned by the applicant.

1.7 PUBLIC NOTIFICATION AND PARTICIPATION

Information on baseline water quality, existing or designated uses, water quality standards, applicability of protection tiers, antidegradation assessments, impacts analyses, discharge permits, monitoring reports, agency decisions, and other matters related to antidegradation reviews will be documented by ADEQ and made part of the public record. Public notification of proposed actions and requests for public comment and hearings will be made in accordance with Chapter 8.

2 Tiered Protection Levels

Description of Tiers and Procedure for Tier-Based Listings Process for Identifying or Revising Tiers

2.1 DESCRIPTION OF TIERS AND PROCEDURE FOR TIER-BASED LISTINGS

Federal and state regulations require that surface waters be protected from activities that might degrade water quality. To implement this requirement, it is necessary to identify protection levels appropriate for each waterbody, and in many cases, the related parameters of concern. The protection tiers assigned to waters in Arizona are based on existing water quality, water quality standards, and, in some cases, the surface water classification (e.g., unique water). Table 2-1 summarizes decision criteria for assigning protection tiers and the antidegradation requirements for each. More information on conducting the antidegradation reviews required for waters requiring Tier 2 and Tier 3 protection can be found in Chapter 3 of this document.

Table 2-1. Tier Descriptions and Summary of Antidegradation Protection Requirements

Tier	Parameters/Waters Included	Protection Requirements
1	<p>All surface waters.</p> <p>All segments on the state's 303(d) impaired waters list for the parameters that resulted in the water segment being listed.</p> <p>All ephemeral streams</p> <p>All intermittent streams</p> <p>All effluent dependent waters</p> <p>All canals.</p>	<p>Existing uses and the level of water quality necessary to protect the existing uses must be maintained and protected, i.e., numeric and narrative water quality criteria for the use must be achieved and/or maintained. Where waterbody uses are impaired, there shall be no lowering of the water quality with respect to the parameters that are causing the impairment.</p>
2	<p>For perennial waters, parameters reflecting high-quality waters, i.e., where the level of water quality is better than applicable water quality criteria. Tier 2 is the default protection level for perennial waters that are not unique waters or listed on the state §303(d) list.</p>	<p>Existing high quality water in perennial streams and lakes must be protected. No significant degradation of the Tier 2 parameters in the waterbody is allowed unless an antidegradation review of reasonable alternatives and social and economic considerations justifies a lowering of water quality. Must also show that the highest requirements for new and existing point sources are achieved and that all cost-effective reasonable nonpoint source controls are implemented. Tier 1 protection applies regardless of any economic or social benefits associated with a proposed activity.</p>
3	<p>Unique waters.</p>	<p>No lowering of water quality allowed unless it is short-term, as determined by the Director of ADEQ on a case-by-case basis.</p>

2.2 PROCESS FOR IDENTIFYING OR REVISING TIERS

Identifying Appropriate Tier

At a minimum, all surface waters in Arizona are protected in accordance with Tier 1 requirements. Tier 1 applies categorically to all intermittent and ephemeral streams, effluent dependent waters, canals, and to surface waters on the state's 303(d) impaired waters list for the parameters that resulted in the water segment being listed. Perennial waters that are found to have water quality better than applicable water quality standards will be protected at the Tier 2 level. Tier 3 protection applies to unique waters listed in R18-11-112.

Where a surface water is listed on the state's 303(d) impaired waters list for one or more parameters, and where water quality for all other parameters is better than water quality standards, the water will be assigned Tier 1 and Tier 2 protection on a parameter-by-parameter basis.

If a protection tier has not already been determined for a perennial surface water, ADEQ will establish the tier by identifying the existing use(s) of the segment, determining baseline water quality (BWQ), and comparing the attributes of the water segment under study to the criteria for the tiers as cited above. ADEQ may gather additional information from other public and private sources, as appropriate. Tier 2 is the default protection level for all perennial waters for all parameters that are better than water quality standards.

Upon establishing the appropriate tier for a surface water, ADEQ will document its findings and make this information available as part of the public record. Tier levels established by ADEQ may be revised, or alternate tier assignments may be made, through the process described in the following section.

Listing or Revising Tier Assignments

Protection levels for surface waters will be determined by ADEQ. ADEQ is overseeing and tracking BWQ characterization and the designation of appropriate protection levels for all Arizona waters.

Where assessment of data indicate that a surface water does not meet applicable water quality standards, such impaired waters will be included on Arizona's 303(d) List of Impaired Waters as set forth in the Impaired Waters Rule, R18-11-602. Tier 1 protection will apply to those parameters that resulted in the waterbody being listed. Tier 1 protection will also apply categorically to all intermittent and ephemeral streams, effluent dependent waters, and canals.

The criteria and process for classifying unique waters with a Tier 3 protection level are outlined in R18-11-112. The process includes a formal request to the Director of ADEQ, submission of information on water quality and other factors, at least one public meeting in the local area, and official rulemaking by ADEQ to classify the surface water as a unique water.

Any person may nominate surface water for Tier 3 (unique water) protection by following the steps and providing the information cited in Table 2-2. In considering a classification, ADEQ will review the criteria outlined in Table 2-2.

Table 2-2. Process for Classifying Unique Waters for Tier 3 Protection Level

Any person may nominate a water to be afforded Tier 3 level of protection by filing a nomination with ADEQ. ADEQ shall consider nominations during the triennial review of water quality standards. The nominating party has the burden of establishing the basis for classifying the waterbody as unique water. The nomination shall include a map and description of the surface water; a statement in support of the nomination, including specific reference to the applicable criteria for unique water classification; supporting evidence that the applicable criteria are met; and available, relevant water quality data for establishing baseline water quality. ADEQ may classify a surface water as a unique water based on the following criteria:

- The surface water is a perennial water and is in a free flowing condition;
- The surface water has good water quality. For the purposes of this regulation, “good water quality” means that the surface water has water quality that meets or exceeds applicable water quality standards; and
- The surface water meets one or both of the following conditions: (a) is of exceptional recreational or ecological significance because of its unique attributes; (b) threatened or endangered species are known to be associated with the surface water or the surface water provides critical habitat for a threatened or endangered species.

ADEQ may adopt, by rule, site-specific water quality standards to maintain and protect existing water quality for a unique water. ADEQ may consider the following factors when making a decision whether to classify nominated surface water as unique water:

- Whether there is the ability to manage the unique water and its watershed to maintain and protect existing water quality;
- The social and economic impact of Tier 3 antidegradation protection;
- Public comments in support or opposition to the unique waters classification;
- The support or opposition of federal and state land management and natural resource agencies to a nomination;
- Agency resource constraints;
- The timing of the unique water nomination relative to the triennial review of surface water quality standards;
- The consistency of a unique water classification with applicable water quality management plans; and
- Whether the nominated surface water is located within a national or state park, national monument, national recreation area, wilderness area, riparian conservation area, area of critical environmental concern, or has another special use designation (for example, Wild and Scenic River designation).

The Department shall hold at least one public meeting in the local area of a nominated unique water to solicit public comment. The nomination and all other information or input collected during the nomination and consideration process will be made part of the public record.

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3 Antidegradation Review Requirements

Waters Subject to Antidegradation Provisions
Antidegradation Review Requirements by Tier
Antidegradation Review Requirements by Type of Activity
Individual AZPDES Permits
Phase 1 Individual Stormwater Permits
Activities Covered by General AZPDES Permits
Activities Covered Under Section 404 Permits and 401 Certification

This chapter outlines the review procedure that will be followed when regulated activities that have the potential to degrade water quality are proposed. The antidegradation review procedure is based on the protection tier assigned to the receiving water segment, the type of receiving water, existing (i.e., baseline) water quality in the receiving water, the projected impacts, and nature of the proposed activity.

A variety of regulated activities that have the potential to degrade water quality are subject to antidegradation review requirements. These activities include point source discharges regulated under the AZPDES permit program; the placement of dredged or fill material regulated under §404 of the Clean Water Act; discharges regulated under federal permits or licenses that are subject to state water quality certification under §401 of the Clean Water Act, and runoff of pollutants or nonpoint pollution from regulated activities. This chapter provides guidance for conducting antidegradation reviews related to these activities.

There are also situations where regulated activities discharge parameters of concern to a perennial water that does not meet water quality standards (i.e., impaired waters listed under §303(d) of the Clean Water Act). In those situations, the Director will determine whether or not the designated or existing uses of the surface water can be attained. If other parameters are better than applicable water quality standards, the perennial water segment will be afforded Tier 2 protection for those parameters. For the parameter(s) for which the surface water is 303(d) listed, the surface water will be protected at the Tier 1 level for the relevant parameter(s) of concern (i.e., those causing the impairment). Discharges of parameters that cause or contribute to violations of water quality standards will not be permitted.

3.1 WATERS SUBJECT TO ANTIDEGRADATION PROTECTION

Antidegradation protection requirements apply to surface waters as defined by R18-11-101(43). “Surface water” has the same meaning as “water of the United States” and includes:

- a. Waters that are currently used, were used in the past, or may be susceptible to use in interstate or foreign commerce;
- b. An interstate water, including an interstate wetland;
- c. All other waters, such as an intrastate lake, reservoir, natural pond, river, stream (including an intermittent or ephemeral stream), creek, wash, draw, mudflat, sandflat, wetland, slough, backwater, prairie pothole, wet meadow, or playa lake, the use, degradation, or destruction of which would affect or could affect interstate or foreign commerce, including any such water:

- ◆ That is or could be used by interstate or foreign travelers for recreational or other purposes;
 - ◆ From which fish or shellfish are or could be taken and sold in interstate or foreign commerce; or
 - ◆ That is used or could be used for industrial purposes by industries in interstate or foreign commerce.
- d. An impoundment of a surface water as defined by this definition;
 - e. A tributary of a surface water identified in subsections (a) through (d) of this definition; and
 - f. A wetland adjacent to surface water identified in subsections (a) through (e) of this definition.

3.2 ANTIDegradation REVIEW REQUIREMENTS BY TIER

Tier 1: Reviews for Protecting Existing Uses

Tier 1 reviews must ensure that the level of water quality necessary to protect existing uses is maintained and protected. In general, the “level of water quality necessary to protect existing uses” is defined by state-adopted water quality standards.

General Applicability

Tier 1 protection applies to all surface waters. In determining whether a surface water is afforded only Tier 1 protection, ADEQ will focus on whether the surface water meets or fails to meet applicable water quality standards.

Non-Perennial Waterbodies

Lack of adequate flow in ephemeral and intermittent streams makes it difficult to characterize baseline water quality and conduct Tier 2 antidegradation reviews. Similarly, lack of flow and/or the nature of flow in effluent dependent waters also makes these waterbodies difficult to characterize, other than simply characterizing the effluent being discharged. These non-perennial waterbodies will receive a categorical Tier 1 protection for all parameters. Applicable water quality standards must be maintained and protected for these waterbodies.

The majority of permitted activities discharge to non-perennial waters and thus will receive Tier 1 review. For example, most individual Arizona Pollution Discharge Elimination System (AZPDES) permit applicants will likely be discharging to an ephemeral stream segment where there is no other existing discharge to the segment, little or no flow in the channel beyond the immediate area of the discharge, and no available ambient water quality data. No baseline water quality assessment will be required for these applications. Antidegradation reviews for these discharges will focus on requirements that applicable water quality standards be met end-of-pipe, and technology-based standards, e.g., best available technology (BAT) is applied as required by permit conditions.

Canals

Canals may have a variety of surface water and ground water sources and baseline water quality in canals may change significantly depending on canal inputs, withdrawals, and discharges. For the purpose of antidegradation reviews, canals will be regulated as Tier 1 waters for all parameters. Applicable water quality standards must be maintained and protected for canals.

Waters on the Arizona 303(d) List

For surface waters listed on the 303(d) list, Tier 1 protection will be provided for the listed parameters; non-listed parameters in 303(d) listed waters may be afforded a higher level of protection. Under this approach, no activities will be permitted to cause further degradation for parameters that do not meet applicable water quality standards unless actions are taken to improve water quality through Total Maximum Daily Load (TMDL) implementation for the parameter(s) that fail(s) to meet applicable water quality criteria, or through other pre-TMDL actions that result in attainment of the relevant criteria. Where existing uses of a surface water are impaired, there will be no lowering of the water quality with respect to the parameters of concern causing the impairment.

Tier 2: Reviews for Protecting High Quality Perennial Waters

Tier 2 protection applies to perennial waters for those parameters with quality better than applicable water quality standards, as determined on a parameter-by-parameter basis. Existing water quality in high quality surface waters must be maintained unless it is determined – after opportunity for intergovernmental review and public comment and hearing – that allowing lower water quality is necessary to accommodate important economic or social development in the area where the waters are located. In addition, all statutory and regulatory requirements for point and nonpoint sources must be met. If limited degradation is allowed, it must not result in violation of applicable water quality standards.

General Applicability

Any regulated activity proposing a new or expanded discharge to a perennial water must conduct an antidegradation review to determine if the activity would significantly degrade water quality. Any regulated activity that would significantly degrade a Tier 2 protected water segment is required to go through additional Tier 2 antidegradation review. If ADEQ determines after an initial assessment that no further Tier 2 review requirements apply to a proposed activity, the activity must still achieve the highest applicable and established statutory and regulatory requirements, or the conditions of the permit or water quality certification, whichever is most protective. Determinations issued under these provisions will be made in accordance with the public notification process described in Chapter 8.

Expedited vs. Comprehensive Tier 2 Review

No individual Tier 2 degradation assessment is required for activities regulated under a general permit or 401 water quality certifications related to a general permit or individual permit. These activities will be required to meet the provisions of the general permit or 401 certification.

A comprehensive Tier 2 review must be conducted for all new or expanded activities regulated under an individual AZPDES permit proposing to discharge to a perennial water. The antidegradation assessment must determine whether or not significant degradation will occur, i.e., whether or not 10 % or more of the available assimilative capacity for any parameter of concern will be consumed as a result of the proposed activity during critical flow conditions.

Comprehensive Tier 2 Antidegradation Review Procedure for Perennial Waters

Degradation under Tier 2 shall be deemed significant if the activity results in a reduction of the available assimilative capacity (the difference between the baseline water quality and the applicable water quality standard) of 10 percent or more at the defined critical flow condition(s) for the parameter(s) of concern. Significant degradation will be determined on a parameter-by-parameter basis for each parameter of concern.

It should be noted that parameters of concern for Tier 2 antidegradation reviews include those parameters reasonably expected to be present in the discharge for which a numeric or narrative water quality criterion exists. If multiple water quality standards apply, the calculations regarding remaining assimilative capacity will be conducted using the most stringent standard.

If a determination is made that significant degradation will occur, ADEQ will determine whether significant degradation is necessary. ADEQ shall determine the necessity of significant degradation by evaluating whether reasonable and cost-effective less degrading or non-degrading alternatives to the proposed activity exist. The applicant will be responsible for conducting the alternatives analysis as described in this guidance. ADEQ will evaluate any alternatives analysis submitted by the applicant for consistency with the requirements outlined in Chapter 6. The alternatives analysis must provide substantive information pertaining to the costs and environmental impacts associated with the following alternatives:

- ◆ Pollution prevention measures
- ◆ Reduction in scale of project
- ◆ Water reuse
- ◆ Treatment process changes
- ◆ Innovative treatment technology or technologies
- ◆ Advanced treatment technology or technologies
- ◆ Seasonal or controlled discharge options to avoid critical flow periods
- ◆ Improved operation and maintenance of existing treatment systems
- ◆ Alternative discharge locations, including subsurface discharges
- ◆ Zero discharge alternatives

After alternatives to allowing significant degradation have been adequately evaluated, a determination shall be made regarding whether cost-effective and reasonable non-degrading or less degrading alternatives to the proposed activity shall be required. This determination will be based primarily on the alternatives analysis developed by the regulated entity, but may be supplemented with other information and data. As a rule of thumb, ADEQ will consider non-degrading or less degrading pollution control alternatives with costs that are less than 110 percent of the costs of the pollution control measures associated with the proposed activity to be cost-effective and reasonable..

If it is determined that reasonable, cost-effective, less degrading or non-degrading alternatives to the proposed activity exist, the project design must be revised accordingly. In general, if such alternative(s) exist, the alternative or combination of alternatives that result in the least amount of degradation must be implemented. If the regulated entity does not agree to adopt such reasonable and cost-effective alternatives, the alternatives analysis findings will be documented and the activity will not be allowed. If significant degradation would occur even after application of reasonable less degrading or non-degrading alternatives, a determination must be made as to whether the proposed activity is necessary to accommodate important economic or social development in the area in which the waters are located. ADEQ will evaluate the social and economic justification for the consistency with the requirements outlined in Chapter 7. The

regulated activity must document the social and economic importance of the proposed activity, including, but not limited to, the following:

- ◆ Employment (e.g., increasing, maintaining or avoiding a reduction in employment)
- ◆ Increased production
- ◆ Improved community tax base
- ◆ Housing (e.g., availability, affordability)
- ◆ Ancillary community economic benefit
- ◆ Correction of an environmental or public health problem

A regulated entity proposing significant degradation of water protected at the Tier 2 level may also be required to submit information pertaining to current aquatic life, recreational, or other water uses; information necessary to determine the environmental impacts that may result from the proposed activity; facts pertaining to the current state of economic development in the area (e.g., population, area employment, area income, major employers, types of businesses); data on the government fiscal base; and the nature of land use in the areas surrounding the proposed activity.

Once the available information pertaining to the socio-economic importance of the proposed activity has been reviewed by ADEQ, a preliminary determination regarding social and economic importance must be made. In evaluating the regulated activity's demonstration of social and economic importance, ADEQ will use the procedures outlined in Chapter 7. If the proposed activity is determined to have social or economic importance in the area in which the affected waters are located, the basis for that preliminary determination shall be documented and the Tier 2 review shall continue. If significant degradation is proposed, the applicant must also show that the highest requirements for new and existing point source discharges are achieved, that all cost-effective reasonable nonpoint source controls are implemented and that Tier 1 protection is provided. If parameters associated with nonpoint sources will be discharged by the applicant – and the discharge associated with the proposed activity will result in significant degradation for those parameters – ADEQ will work with the applicant and the nonpoint sources to assure that all cost-effective reasonable nonpoint source controls are implemented.

Tier 2 reviews include the public participation provisions outlined in Chapter 8. Once the intergovernmental coordination and public participation requirements are satisfied, the Director of ADEQ will then make a final determination concerning the social or economic importance of the proposed activity. All key determinations, including determinations to prohibit the activity, must be documented and made a part of the public record.

It is recommended that an applicant discharging into a perennial water meet with ADEQ in a pre-application conference at least two years prior to permit issuance.

Tier 3: Reviews to Protect Unique Waters

Water quality in unique waters must be maintained and protected. Any proposed new or expanded regulated activity that would degrade water quality for any parameters in waters designated as a unique water is prohibited, unless the applicant demonstrates that the impacts are temporary.

General Applicability

Tier 3 protection applies only to surface waters that are classified as unique waters and listed in R18-11-112 (E). Currently, there are 18 unique waters in Arizona. They are:

1. The West Fork of the Little Colorado River, from its headwaters to Government Springs;
2. Oak Creek, including the West Fork of Oak Creek; from its headwaters to the Verde River;
3. Peoples Canyon Creek; from its headwaters to the Santa Maria River;
4. Burro Creek, from its headwaters to Boulder Creek;
5. Bonita Creek, from the San Carlos Indian Reservation boundary to the Gila River;
6. Cienega Creek, in Pima County;
7. Aravaipa Creek, from its confluence with Stowe Gulch to the downstream boundary of the Aravaipa Canyon Wilderness Area;
8. Cave Creek and the South Fork of Cave Creek from their headwaters to the Coronado National Forest boundary (in the Chiricahua Mountains);
9. Buehman Canyon Creek from its headwaters to approximately 9.8 miles downstream, a tributary to the San Pedro River;
10. Lee Valley Creek from its headwaters to Lee Valley Reservoir;
11. Bear Wallow Creek, from its headwaters to the boundary of the San Carlos Indian Reservation;
12. North Fork of Bear Wallow Creek from its headwaters to Bear Wallow Creek;
13. South Fork of Bear Wallow Creek from its headwaters to Bear Wallow Creek;
14. Snake Creek from its headwaters to the Black River;
15. Hay Creek from its headwaters to the West Fork of the Black River;
16. Hay Creek, from its headwaters to the West Fork of the Black River;
17. Stinky Creek, from the Fort Apache Indian Reservation boundary to the West Fork of the Black River;
18. KP Creek, from its headwaters to the Blue River.

Tier 3 Antidegradation Review Process

Regulated activities that impact unique waters are subject to Tier 3 review. **New or expanded discharges directly to a unique water are prohibited.** For example, a new or expanded discharge from a wastewater treatment plant directly to one of the 18 unique waters would be prohibited by the Tier 3 antidegradation rule. In addition, ADEQ will impose whatever controls are necessary on regulated discharges to tributaries of unique waters to maintain and protect existing water quality in a downstream unique water.

In determining impacts from a proposed activity on a unique water, ADEQ will determine whether the proposed activity is short-term in nature and the resulting changes in water quality will not be permanent. In general, temporary impacts are defined as those occurring for a period of six months or less. The applicant shall use all practical means to minimize temporary adverse impacts to a unique water.

Determinations regarding antidegradation reviews for unique waters will be made on a case-by-case basis after consideration of the following factors:

- ◆ The length of time during which the water quality will be lowered;
- ◆ The percent change in ambient concentrations and the parameters affected;
- ◆ The likelihood for long-term water quality benefits to the segment (e.g., as may result from dredging of contaminated sediments);
- ◆ The degree to which achieving applicable water quality standards during the proposed activity may be at risk; and
- ◆ The potential for any residual long-term impacts or influences on existing uses.

If after review of the factors above, ADEQ determines that the proposed activity will be temporary in nature and the changes in water quality will be minimal, the proposed activity may be authorized. In such case, the antidegradation review findings must be documented and public participation activities initiated. If the review finds that the proposed activity will not be temporary or that changes in water quality will not be minimal, the proposed activity will be denied. In all cases, Tier 1 protection must be maintained.

Any proposed regulated activity that would result in a permanent new or expanded discharge upstream of a Unique Water segment is prohibited except where such source would improve or not degrade the existing water quality of the downstream Unique Water. To determine whether the proposed activity will result in the lowering of water quality in the downstream Unique Water, the following factors may be considered:

- ◆ Change in ambient concentrations predicted at the appropriate critical condition(s)
- ◆ Change in loadings (i.e., the new or expanded loadings compared to total existing loadings to the segment)
- ◆ Reduction in available assimilative capacity
- ◆ Nature, persistence and potential effects of the parameter
- ◆ Potential for cumulative effects
- ◆ Degree of confidence in the various components of any modeling technique utilized (e.g., degree of confidence associated with the predicted effluent variability)

If a preliminary determination is made that the requirements above will be met, the antidegradation review findings must be documented and the applicable public notice activities must be initiated. If the review finds that the proposed activity will result in the lowering of water quality in the downstream unique water stream segment, the proposed activity will be denied.

3.3 Antidegradation Review Requirement by Type of Activity

Antidegradation review requirements for regulated activities that may degrade water quality will vary according to 1) classification, existing uses, and condition of the receiving waterbody; 2) the type of activity and permit under which the activity is conducted; and 3) the range and severity of projected impacts on the waterbody. For example, antidegradation review requirements for activities authorized under general permits will be different than review requirements for activities subject to individual AZPDES permits. This section outlines the antidegradation review requirements for regulated activities that may degrade water quality, including those with individual and general AZPDES permits, and those covered by §401 certification of federally-permitted or licensed discharges (e.g., §404 permits).

It should be noted that all regulated activities are subject to an antidegradation review at the time of issuance or reissuance of a permit (e.g., individual, general, regional, or nationwide). Activities covered under general permits or §401 water quality certifications are not required to undergo a Tier 2 antidegradation review as part of the NOI submittal process. However, the collective and cumulative impact of those activities may be subject to an antidegradation review at the time the general permit or §401 certification is issued. Compliance with the requirements of general permits and certifications and prompt attention to conditions that might result in water quality degradation will help ensure that activities authorized by general permits do not cause violations of water quality standards.

A discharge authorized by a general permit is subject to an individual antidegradation review if the discharge may degrade a unique water protected at the Tier 3 level. In addition, some new or expanded activities formerly covered by a general permit may not be eligible for such coverage in the future if ADEQ believes they could significantly degrade a surface water. In those cases, applicants will be required to seek coverage under an individual permit.

Nonpoint sources are subject to antidegradation requirements. In general, nonpoint source activities that 1) demonstrate proper selection, design, installation, and maintenance of cost-effective and reasonable best management practices, and 2) adhere to best management practices that prevent or minimize degradation of surface waters are deemed to be in compliance with antidegradation requirements. Where regulations or permit programs exist to control nonpoint sources, compliance with antidegradation requirements includes full and complete compliance with the regulations, permits, best management practices or procedures recommended or required under the regulatory program. Example nonpoint source permit programs include Phase I Stormwater, Phase II Municipal Stormwater, Construction Activities, Industrial Stormwater, Confined Feeding Operations, and other nonpoint sources subject to general permit or regulatory programs.

The CWA regulations at 40 CFR §131.12 do not require ADEQ to establish BMPs for nonpoint sources where a regulatory program for nonpoint source pollution control does not exist. The regulations leaves it to the states to determine what, if any, controls on nonpoint sources are needed to provide for attainment of state water quality standards. States may adopt enforceable requirements, or voluntary programs to address nonpoint sources of pollution. 40 CFR §131.12(a)(2) does not require that states adopt or implement best management practices for nonpoint sources prior to allowing point source degradation of a high quality water. However, states that have adopted nonpoint source controls must assure that such controls are properly implemented before authorization is granted to allow point source degradation of water quality. US EPA interprets 40 CFR §131.12(a) as prohibiting point source degradation as unnecessary to accommodate important economic and social development if it could be partially or completely prevented through implementation of existing state-required BMPs.

In order to implement Arizona's antidegradation policy in an efficient manner, it is highly recommended that persons proposing individually permitted new or expanded activities which might degrade water quality notify ADEQ before determining baseline water quality (see Chapter 4) or applying for a permit. Such an approach will help ensure that the antidegradation review proceeds smoothly, without disruption or delay, and that planned facilities or activities will comply with applicable statutes and rules.

Figure 3-1 summarizes the review requirements for individual AZPDES; AZDEQ Phase I Individual Stormwater Permits; general AZPDES permits; and §404 permits and §401 certification. More specific review requirements are detailed in the following sections for the permit categories.

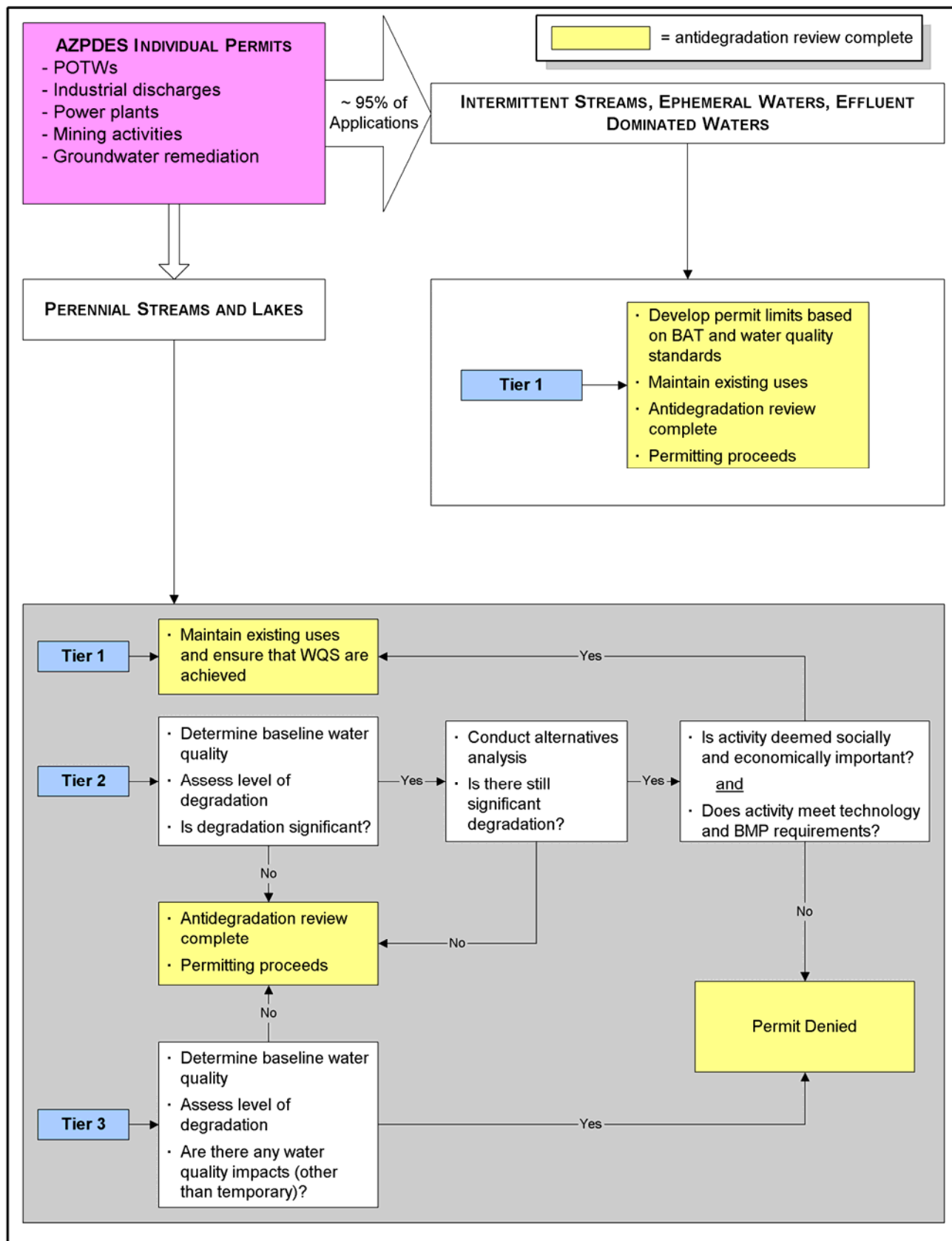
3.3 INDIVIDUAL AZPDES PERMITS

This section describes the antidegradation review process for AZPDES individually permitted facilities and activities. It should be noted that the guidance below does not cover the entire range of activities, situations, and contingencies that may be encountered during the permitting and antidegradation review procedures. When statutes, rules, or this guidance do not provide a clear indication of how a review is to be conducted, ADEQ will act in accordance with the directives of the Director to fulfill the intent of the antidegradation policy.

General Applicability

All point source discharges regulated by individual AZPDES permits are subject to an antidegradation review when new or expanded activities are proposed, or at the time of permit renewal. Discharges authorized by general AZPDES permits are subject to a categorical antidegradation review when the general permit is issued or renewed. Activities that do not meet AZPDES general permit conditions must seek coverage under an individual permit and complete an individual antidegradation review. Permits for new or expanded activities must consider the protection level of the receiving water when developing limits for parameters of concern, characterizing effluent quality, or assessing other activities which may degrade water quality. At a minimum, all permits must ensure that water quality is protected at the Tier 1 level (i.e., the level of water quality necessary to maintain existing uses must be maintained and protected).

General AZPDES permits may be subject to a full antidegradation review if the Director determines that cumulative degradation resulting from multiple discharges within a watershed, degradation from a single discharge over time, degradation caused by permit noncompliance or permit inadequacies, or other individual circumstances warrant a full antidegradation review.



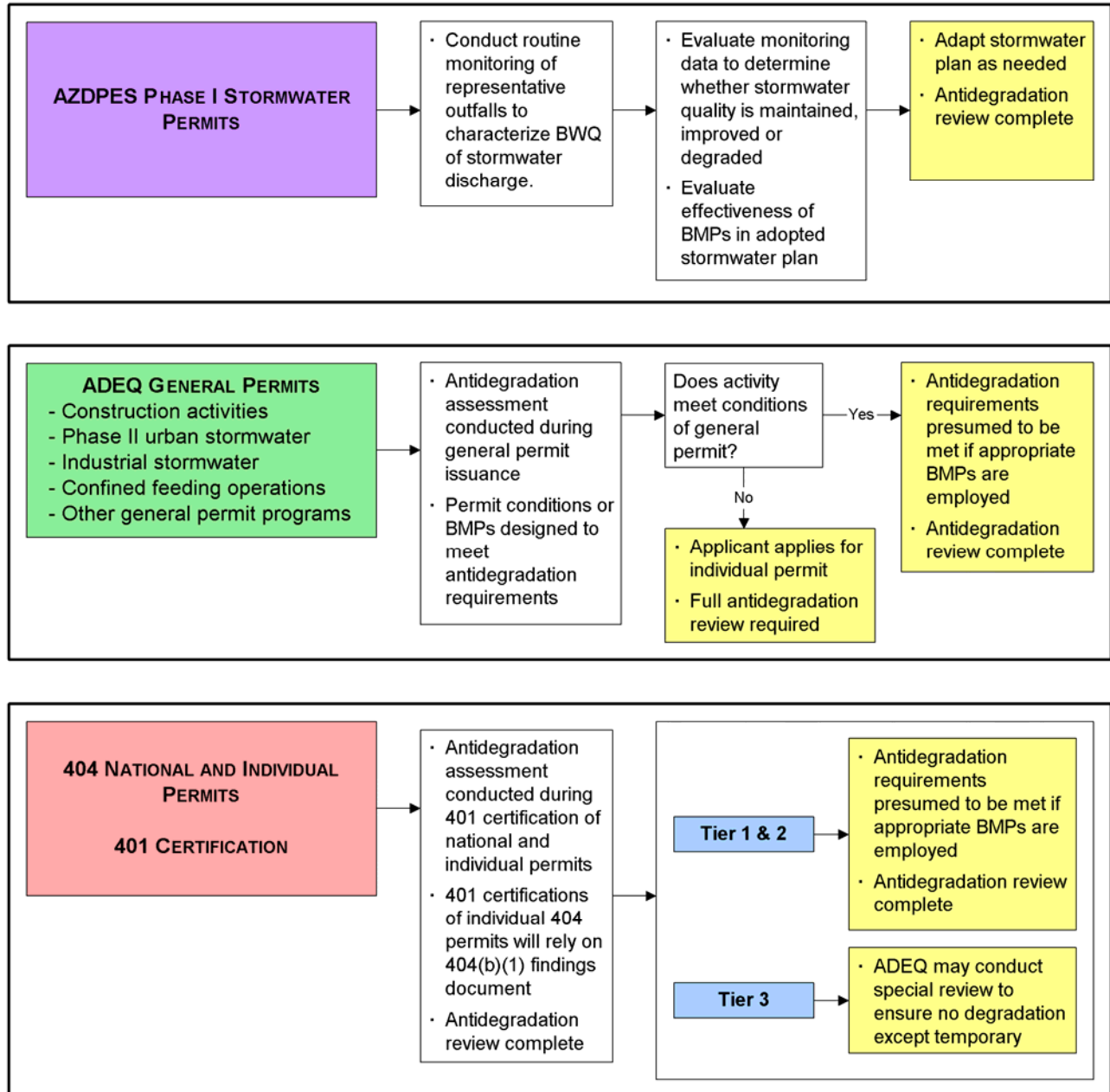


Figure 3-1. Antidegradation Review Requirements by Permitted Activities

Overview of the Antidegradation Review Procedure

The antidegradation review for individually AZPDES-permitted facilities will be based upon the assigned protection level and baseline water quality (BWQ; see Chapter 4) of the receiving water, the existing uses of the segment, the applicable water quality standards, the flow regime of the receiving water, parameters of concern associated with the discharge, the projected impacts on the receiving water, cumulative impacts from other pollutant sources, and the significance of any degradation that might occur as a result of the discharge. For permit renewals where past permits included higher-than-needed (i.e., higher than used) effluent limits on existing discharges, new permit limits should be based on 1) technology based standards; 2) water quality-based effluent limits (WQBELs), if the discharge is to a water quality limited segment; 3) existing actual discharge concentrations, if they are significantly lower than the previous permit limits; and 4) antidegradation requirements.

Antidegradation reviews for discharges from industrial facilities will be handled in a manner similar to those related to wastewater treatment plants, i.e., the review will focus on the status of the receiving water segment, the characteristics of the discharge, and the impact(s) of the discharge and other sources upon the receiving water. All applicants will be required to identify parameters reasonably expected to be in the discharge, estimate flow rates, and characterize pollutant concentrations and/or mass pollutant loads, as specified by ADEQ. In addition, applicants will be expected to collect and submit existing or new information on BWQ needed to analyze the impact(s) of the discharge upon a perennial water if data are not available.

Permit Limits and Antidegradation Requirements for Individual Permits

ADEQ must ensure that water quality associated with the existing use(s) for each receiving water segment is maintained and protected, and that antidegradation requirements are considered in the development of permit limits.

Permit Limits for Discharges to Perennial Waters In the case of point source discharges to perennial waters, the primary antidegradation implementation activities will occur when permit limits are calculated and issued. During the permit development or renewal process, ADEQ will assess baseline water quality using both internal and applicant-supplied data, identify existing and designated uses of the receiving segment, and analyze the impacts of the discharge as well as cumulative discharges that might affect the assimilative capacity of the receiving segment for relevant parameters of concern.

Because the permit limits have a significant impact on the treatment processes, technologies, and procedures used by the applicant, it is important that ADEQ be notified early as to the nature of the activity, discharge location, and effluent characteristics. Developing permit limits requires collection of a considerable amount of information on the receiving water, the applicant's discharge, and other activities in the drainage area. Early notification will ensure that the information collection process begins well before the applicant needs a permit limit to conduct planning activities, seek funding, design facilities, or proceed with project construction. It is recommended that an applicant discharging into a perennial water meet with ADEQ in a pre-application conference at least two years prior to permit issuance.

The following section provides an overview of how permit limits will be developed and issued under the state's antidegradation implementation procedures for discharges to perennial waters. It should be noted that much of the antidegradation review for an activity regulated by an individual AZPDES permit will occur during the permitting process. Projects that propose to significantly degrade waters protected at the Tier 2 level must undergo a comprehensive antidegradation review to determine whether less degrading or non-degrading alternatives exist and whether

significant degradation justified on the ground that it is necessary to accommodate important social economic and social development in the area of the point source discharge.

Basis for Developing Permit Limits for Point Source Discharges to Perennial Waters

Individual permit limits will be based upon applicable effluent guidelines, the characteristics of the discharge, and analyses designed to ensure that no significant degradation of the receiving water occurs. In addition, the permit limits must ensure that existing uses are maintained and protected.

Under Arizona's antidegradation program, significant degradation is defined as the consumption of 10 percent or more of assimilative capacity of the receiving water for any parameter of concern associated with the discharge during critical flow (e.g., 7Q10) conditions.

No increase in ambient concentrations of persistent bioaccumulative pollutants will be permitted. The list of persistent bioaccumulative parameters is found in the Mixing Zone Rule at R18-11-114(K) and includes chlordane, DDT and its metabolites (DDD and DDE), dieldrin, dioxin, endrin, endrin aldehyde, heptachlor, heptachlor epoxide, lindane, mercury, PCBs, and toxaphene.

At a minimum, permit limits for permit renewals must assure Tier 1 protection. Permit limits for new or expanding activities with individual AZPDES permits will include discharge limitations for toxic pollutants reasonably expected to be present in the discharge.

Early notification and consultation between the applicant and ADEQ will help ensure that the process proceeds efficiently. The following steps outline the general procedure for processing an AZPDES permit:

- ◆ Applicant notifies ADEQ of intent to apply for permit coverage
- ◆ ADEQ determines eligibility for general permit or individual permit coverage
- ◆ Applicant or ADEQ collects BWQ information for applicable parameters of concern
- ◆ ADEQ develops draft permit limits based on effluent and antidegradation requirements
- ◆ Applicant applies for permit after consultation with ADEQ
- ◆ ADEQ develops final permit limits for parameters of concern
- ◆ ADEQ issues permit to applicant after antidegradation review

The applicant's eligibility for general permit coverage is contingent upon: 1) protection of existing uses for the receiving waterbody, 2) prevention of significant degradation for parameters protected at the Tier 2 level, and 3) prevention of degradation of unique waters unless the degradation is short-term and not significant. If the applicant is not able to propose a project that prevents significant degradation, then an individual permit and appropriate antidegradation review will be required.

Applicants seeking individual permit coverage may be required to provide or collect instream baseline water quality information on parameters of concern (e.g., pH, metals) reasonably expected to be in the discharge, if that information is not available (see Chapter 4). Table 3-1 shows the minimum BWQ information required, by size of discharge, before permit development. Other parameters may be required depending on the nature of the proposed discharge and the parameters reasonably expected in the discharge. The BWQ requirements will be based on the effluent characterization of the facility. Antidegradation requirements are not applied within ADEQ-approved mixing zones, but must be met at the edge of the mixing zone.

Table 3-1. Minimum BWQ Information for Dischargers

Parameter	All Dischargers	Discharges < 0.1 MGD	Discharges > 1.0 MGD
Flow	U	U	U
Temperature	U	U	U
BOD5/CBOD5/DO	U	U	U
E. coli	U	U	U
Total Suspended Solids	U	U	U
pH	U	U	U
Total Ammonia		U	U
Total Residual Chlorine		U	U
Total Nitrogen		U	U
Total Phosphorus		U	U
Total Dissolved Solids		U	U
Antimony			U
Arsenic			U
Beryllium			U
Cadmium			U
Copper			U
Lead			U
Mercury			U
Nickel			U
Selenium			U
Silver			U
Thallium			U
Zinc			U
Hardness			U

ADEQ will develop and issue permit limits based on the information received from the applicant and other sources. Water quality standards must be met and existing uses maintained for waters protected at the Tier 1 level (i.e., all surface waters). For the Tier 2 level, if the applicant is not able to meet limitations that do not cause significant degradation, further antidegradation review (i.e., alternatives analysis, economic/social justification) will be required. As noted above, degradation of unique waters protected at the Tier 3 level will not be permitted except for degradation that is short-term. After the required antidegradation review is completed, ADEQ will proceed with permit issuance or re-issuance.

Permit Limits for Ephemeral, Intermittent and Effluent Dependent Waters

Permit limits for discharges to ephemeral, intermittent, and effluent dependent waters will be based upon:

- ◆ Numeric or narrative water quality standards for the waterbody under review, as described in the Arizona Administrative Code, Title 18, Chapter 11.
- ◆ US Environmental Protection Agency Effluent Guidelines and Standards and other technology based requirements (e.g., BAT).

3.4 ACTIVITIES COVERED BY PHASE I STORMWATER PERMITS

Urban areas with populations greater than 100,000 (Stormwater Phase I MS4 communities) are required to apply for an individual AZPDES permit. However, Phase 1 MS4s are not required to meet the same antidegradation requirements for other individual AZPDES permits outlined above.

Antidegradation reviews for Phase 1 MS4 permittees will be based on an adaptive management approach. Initially, this will include routine monitoring of stormwater quality at representative outfalls to adequately characterize the BWQ of their stormwater discharge. Adequate data for establishing BWQ should be collected during three permit cycles. Once BWQ is established, the MS4 will then evaluate, through effectiveness monitoring, whether the stormwater quality is being maintained, improved, or degraded and whether BMPs identified in the MS4's stormwater management plan are effective. Future antidegradation review of Phase 1 MS4s will consist of an analysis of the effectiveness of the BMPs and compliance with the Phase 1 ADEQ permit.

3.5 ACTIVITIES COVERED BY GENERAL AZPDES PERMITS

A number of discharges to surface waters are authorized under general AZPDES permits issued by ADEQ. These include stormwater runoff from municipalities required to comply with Phase 2 stormwater rules, industrial activities covered by the stormwater program, and construction sites one acre or larger. Well discharges (for potable water wells, well testing, and well development) also are covered by general permits.

Regulated activities that are covered under general permits are not required to undergo a Tier 2 antidegradation review as part of the permitting process. However, new and reissued general permits must be evaluated to consider the potential for significant degradation as a result of the permitted activities.

All AZPDES general permits require that permit conditions be met, including the general requirement that permitted activities must ensure that water quality standards are not violated and best management practices contained in the permit are implemented. Compliance with the terms of the general permits issued by ADEQ is required to maintain coverage under the permit. Facilities or activities covered by a general permit that do not comply with general permit conditions or antidegradation requirements will be disallowed or required to seek coverage under an individual permit. The following sections describe the general antidegradation implementation provisions for various types of activities covered by general permits.

Overview of the Antidegradation Review Procedure for General Permits

Antidegradation reviews for activities covered under general permits will occur for the entire class of general permittees when the general permit is issued or may be required by ADEQ in

cases where impacts may be significant or prevent the attainment of an existing use. Antidegradation reviews will focus on parameters of concern that may contribute to water quality impairment.

Certain general permit programs are now being implemented, such as stormwater from construction activities and from urbanized areas. Information regarding the existence, effectiveness, or costs of control practices for controlling flows, reducing pollution, and meeting the water quality and antidegradation requirements of these programs is emerging. For permittees covered under general permits, the antidegradation requirements of this section can be considered met for permits and programs that have a formal process to select, develop, adopt, and refine control practices (i.e., design, installation, and maintenance) for protecting water quality. This adaptive process must ensure that information is developed and used to revise permit or program requirements.

3.6 ACTIVITIES COVERED UNDER SECTION 404 PERMITS AND SECTION 401 CERTIFICATION OF THE CLEAN WATER ACT

Section 404 of the Clean Water Act regulates the placement of dredged or fill material into the waters of the United States, including small streams and wetlands adjacent or connected to jurisdictional waters. The U.S. Army Corps of Engineers (USACE) administers the permit program dealing with these activities (e.g., wetland fills, instream sand/gravel work, etc.), in cooperation with the U.S. Environmental Protection Agency (US EPA) and in consultation with other public agencies. Individual permits are issued for activities with significant impacts. Activities covered under Section 404 permits include any activity that results in the placement of dredged or fill material into the waters of the U.S., including but not limited to the following:

Aids to Navigation	Removal of Vessels
Structures in Artificial Canals	Structural Discharges
Maintenance Activities	Stream and Wetland Restoration Activities
Survey Activities	Modifications of Existing Marinas
Outfall Structures and Maintenance	Single-family Housing
Oil and Gas Structures	Maintenance of Existing Flood Control Facilities
Mooring Buoys	Temporary Construction, Access and Dewatering
Temporary Recreational Structures	Maintenance Dredging of Existing Basins
Utility Line Activities	Boat Ramps
Bank Stabilization	Emergency Watershed Protection/Rehabilitation
Linear Transportation Projects	Cleanup of Hazardous and Toxic Waste
U.S. Coast Guard Approved	Residential, Commercial, Institutional Developments
Bridges	Agricultural Activities
Hydropower Projects	Reshaping Existing Drainage Ditches
Minor Discharges	Recreational Facilities
Minor Dredging	Stormwater Management Facilities
Oil Spill Cleanup	Mining Activities
Surface Coal Mining Activities	

For minor activities covered under Section 404 general permits (e.g., road culvert installation, utility line activities, bank stabilization, etc.), antidegradation requirements will be deemed to be met if all appropriate and reasonable BMPs related to erosion and sediment control, project stabilization, and prevention of water quality degradation (e.g., preserving vegetation, stream bank stability, and basic drainage hydrology) are applied and maintained. Applicants desiring to fulfill antidegradation review requirements under this approach will be responsible for ensuring that permit requirements and relevant water quality certification conditions are met.

Nationwide or regional general permits are issued for activities with impacts not deemed to be significant. Individual permits are issued for activities that are considered to have more than minor adverse impacts. In all cases, i.e., for both individual and general §404 permits, states have an obligation to certify, certify with conditions, or not certify §404 permits under §401 of the Clean Water Act. Antidegradation evaluations involving the placement of dredged or fill material will be performed via the §401 water quality certification process and evaluations that consider broad ecosystem-level impacts.

Arizona manages its §401 water quality certification program to ensure that activities resulting in the placement of dredged or fill material into surface waters do not cause water quality impairments or significant degradation of surface waters. Under the BMP-based approach adopted by Arizona, regulated activities that qualify for coverage under U.S. Army Corps of Engineers regional or nationwide §404 permits that have been certified by the state pursuant to §401 of the Clean Water Act will not be required to undergo a Tier 2 antidegradation review at the time of submitting a NOI and receiving a permit to discharge.

The decision making process for the Section 404 individual permits is contained in the §404(b)(1) guidelines (40CFR Part 230) and contains all of the required elements for a Tier 1 and Tier 2 antidegradation review. Prior to issuing a permit under the §404(b)(1) guidelines, the Corps of Engineers must: 1) make a determination that the proposed discharges are unavoidable (i.e., necessary); 2) examine alternatives to the proposed activity and authorize only the least damaging practicable alternative; and 3) require mitigation for all impacts associated with the activity. A §404(b)(1) findings document is produced as a result of this procedure and is the basis for the permit decision. Public participation is also provided for in this process. Because the §404(b)(1) guidelines meet the requirements of a Tier 1 and Tier 2 antidegradation review, ADEQ will not conduct a separate review for the proposed activity. Tier 1 and Tier 2 antidegradation review will be met through §401 certification of individual 404 permits and will rely upon the information contained in the §404(b)(1) findings document.

Regulated activities that may degrade waters protected at the Tier 3 level must comply with the antidegradation requirements applicable to those protection levels (i.e., only temporary impacts permitted) before a §401 certification will be granted. An activity authorized under nationwide 404 permits and an individual 404 permit will require an individual §401 certification if it will discharge to a unique water to ensure that impacts will be temporary.

Antidegradation Review Considerations

In order to ensure that antidegradation and other water quality protection requirements are considered, reviewed, and met in a comprehensive and efficient manner, these requirements will be addressed and implemented through the permitting and water quality certification processes. Under this approach, applicants who fulfill the terms and conditions of applicable §404 permits and the terms and conditions of the §401 state water quality certification related to the §404 permit will be considered to meet antidegradation requirements. Antidegradation considerations will be incorporated into §404 permits and the corresponding §401 certifications at the time of permit re-issuance.

ADEQ reserves the right to make case-specific determinations regarding the implementation of this approach during the §404 permitting or §401 water quality certification processes, which must be completed prior to the commencement of any activities that result in the placement of dredged or fill material into state waters. In general, the affected waters from all activities that result in the placement of dredged or fill material into state waters must meet Tier 1 protection requirements at a minimum, and meet the antidegradation requirements for higher-tiered waters if they will be degraded as a result of the activity.

Impacts to Downstream or Adjacent Waters

It is important to note that where an activity covered by a state-certified (i.e., under §401) §404 regional or nationwide general permit allows for placement of dredged or fill material, the permit only applies to the site of the fill and does not apply to activities or conditions downstream of or adjacent to the site of the fill.

Certain nationwide and regional permits require individual 401 certification by the State of Arizona. During that individual certification process, ADEQ will evaluate any potential impacts to downstream waters and incorporate certification requirements to ensure compliance with all aspects of the antidegradation rule.

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4 Determining Baseline Water Quality

*Summary of Approach
Baseline Water Quality Assessment Procedures
BWQ Sampling Location
Sampling and Analytical Protocol
Parameters of Concern
Interpretation of Data and Determination of BWQ*

4.1 SUMMARY OF APPROACH

Arizona's Antidegradation rule states that "existing water quality shall be maintained and protected" for Tier 2 and Tier 3 (i.e., unique) surface waters. *Existing* water quality – or baseline water quality (BWQ) – provides the yardstick against which predicted degradation associated with a regulated activity is measured. For Tier 1 protection, which is applicable to all surface waters, "no degradation of existing water quality is permitted" for any parameter causing water quality to not meet the applicable water quality standard.

This section describes how baseline water quality is characterized through:

- ◆ Establishment of BWQ information for surface waters using existing assessment data where they exist.
- ◆ Approaches which consider the size and potential impacts of the proposed discharge when determining data needs for BWQ characterization and degradation screening, analysis, and assessment.
- ◆ Cooperative action by both ADEQ and the applicant to generate BWQ information where few or no data exist.

In general, BWQ for perennial waters will be based upon existing assessments conducted under current monitoring and assessment programs. BWQ assessments will seek to gather information on parameters of concern reasonably expected to be in wastewaters or runoff associated with activities regulated by state, federal, or local agencies. Such parameters may include, among others, suspended and settleable solids, sediment, nutrients, bacteria, BOD, organics, metals, etc.

Where no, or few, data exist, ADEQ will advise the applicant on what data are needed and provide guidance to the applicant on how to collect and report the needed information to ADEQ. For perennial waters, the priority approach for assessing baseline water quality is to use existing water quality data. Where adequate data are not available, the second priority approach is to collect new water quality data. The third approach for assessing baseline water quality is to use an appropriate water quality model. At times, more than one approach may be needed to characterize BWQ. Note that due to the lack of flow on intermittent, effluent dependent, and ephemeral waters, and the highly managed nature of canal systems where relative contributions of source water varies significantly, these types of waterbodies will be subject to Tier 1 protection levels and applicable discharge effluent limits for all parameters. Therefore, applicants proposing discharges to these surface waters will not be required to develop BWQ.

In general, individual BWQ characterizations will not be required for minor activities conducted under general permits unless there are parameters of concern reasonably expected in the discharge that might cause loss of an existing use or permanent degradation of a unique water. Table 4-1 summarizes the BWQ requirements by the type of permit.

Table 4-1. Applicability of BWQ Requirements to Permit Types

Type of Permit	BWQ Requirement
AZPDES Individual Permits <ul style="list-style-type: none"> ▪ Ephemeral streams, intermittent streams, effluent dependent waters ▪ Perennial waters 	Effluent limits (e.g., BAT) and Water Quality Standards to be met end-of-pipe; no BWQ assessment is required BWQ assessment required
AZPDES General Permits	Comply with prescribed BMPs No BWQ required except on unique waters
404 Permits and 401 Water Quality Certification; other permits or certifications	Comply with prescribed BMPs or certification requirements No BWQ required except on unique waters

The regulated entity generally will be required to provide baseline water quality data for those parameters of concern that are reasonably expected to be discharged as a result of the regulated activity, to help ADEQ determine BWQ, the existing uses, and the applicable tier. The regulated entity is advised to contact ADEQ prior to initiating a BWQ evaluation to seek guidance and concurrence regarding the parameters to be assessed and the proposed sampling protocol.

4.2 BASELINE WATER QUALITY ASSESSMENT PROCEDURES

Baseline water quality must be established in order to conduct an antidegradation review for regulated activities that may degrade perennial surface waters. Specifically, BWQ must be established if no BWQ characterization is available or if no information is available for a parameter of concern reasonably expected to be discharged into the waterbody. The Director may consider data for establishing the baseline water quality from a federal or state agency, the regulated entity, the public, or any other source as long as the data: 1) were collected in accordance with an approved quality assurance project plan; and 2) were collected using specified assessment or sample collection and analysis protocols. If adequate data are not available, ADEQ may require the applicant to obtain the necessary data.

For any new or expanded operation seeking permit coverage, BWQ must be established for the perennial receiving water into which a regulated entity intends to discharge before permitting decisions can be made. If adequate water quality data are not available to establish BWQ, regulated entities will be required to generate and provide such data. It is recommended that regulated entities submit their monitoring and QA/QC plans well in advance (e.g., at least six months in advance) of any planned activities or permit application submittals, to facilitate and streamline subsequent permitting processes. Environmental groups, trade organizations, the general public, ADEQ and other governmental agencies may also elect to generate BWQ data with the prior approval of ADEQ and under appropriate, documented quality assurance / control procedures. Multiple regulated entities located on a water segment may combine resources to generate BWQ data and may join with other watershed stakeholders in the effort. The technical complexity associated with this process precludes establishment of universally applicable

procedures. However, the objective of this effort – generating a reasonable, credible, and defensible characterization of existing water quality – provides a framework for conducting such activities when needed to conduct antidegradation reviews.

Given the complexity of the issue, potential generators of BWQ data are expected to notify ADEQ of their intent to generate data and to obtain agency concurrence on proposed sampling protocols, location, parameters, reporting format, etc., prior to initiating data collection efforts. The initial consultation with the agency may also be used by regulated entities to evaluate the availability of existing data that may be used as a supplement to, or in lieu of, new BWQ data.

During data generation projects by regulated entities or third parties, ADEQ may conduct field or laboratory audits to verify that data generators are adhering to established protocols, and may split samples for independent analysis. Generators that proceed without agency notification and concurrence risk rejection of the data and significant delays in the permitting process. Potential generators of BWQ data are also encouraged to notify other regulated entities and stakeholders in the segment of their intent to generate BWQ data. Stakeholder cooperation in the BWQ assessment process may allow sharing of the cost of data generation and avoidance of conflict in subsequent permitting actions.

Once BWQ is established for a surface water segment, it is the yardstick against which degradation is measured during all future antidegradation reviews on the segment. If future monitoring data indicate that BWQ is improving due to upstream point or nonpoint source controls or other reasons, ADEQ may revise BWQ upward for the segment. Antidegradation policy does not allow a lowering of BWQ, i.e., BWQ is not a moving target, unless it moves upward. However, if it is shown that there was an error in calculating BWQ, then BWQ can be reevaluated.

4.3 BWQ SAMPLING LOCATION

For proposals by regulated entities that entail a new or expanded discharge into a perennial water where there are no existing water quality data on the surface water (i.e., where new data must be collected for assessment of baseline water quality), the location of the BWQ assessment location generally will be immediately upstream of the proposed discharge location.. For lakes, BWQ will be assessed near tributary inlet mixing areas, in the main body of the lake, or in other areas of the lake as appropriate. Determinations regarding BWQ characterization and accommodation of variations caused by seasonal impacts, water level fluctuations, or other factors will be made by ADEQ.

Where there is adequate, existing water quality data from multiple sampling sites on a surface water, these stations can become the BWQ stations from which a composite BWQ characterization can be developed. Alternatively, ADEQ may choose one existing monitoring site as the BWQ station from which to characterize baseline water quality. ADEQ may request additional monitoring at the site if the existing data are insufficient, e.g., where no information has been collected on parameters of concern reasonably expected in the proposed discharge.

Generally BWQ will be assessed and characterized at the discharge point in the receiving surface water. Compliance will be assessed based on meeting the antidegradation and/or other permit limits, per permit requirements.

Where discharges enter permitted mixing zones, the BWQ will be determined on a case-by-case basis. Antidegradation requirements do not apply within mixing zone areas, but must be met at the edge of the mixing zone.

4.4 SAMPLING AND ANALYTICAL PROTOCOL

In general, BWQ will be established through existing monitoring and assessment programs sponsored or approved by ADEQ. If no data exist for a surface water, ADEQ may require the applicant to collect and report such data as might be needed, as specified below. For detailed approved sampling and analytical procedures, refer to the *Credible Data Requirements* in the Impaired Waters Rule, R18-11-602, and the *Fixed Station Network Procedures Manual for Surface Water Quality Monitoring*, ADEQ, (February 16, 2000).

It is important to note that the BWQ pollutant concentrations derived from the data generated will be assumed to be the concentration present during the normal annual low-flow period. Use of existing, available and appropriate data or collection of new data are the preferred approaches to determining BWQ. As noted below, the applicant may also use an appropriate model to represent BWQ conditions. Applicants may be required to collect BWQ data after the permit is issued to develop a BWQ profile during buildout of the activity's discharge capacity.

In most cases, ambient water quality data for perennial waters should be no older than five years. ADEQ will consider the use of older data on a case-by-case basis, as deemed appropriate, if such data is representative of baseline water quality conditions. In cases where significant changes have occurred in the watershed in the last five years, it may be appropriate to use a shorter period of record. The minimum elements of an acceptable BWQ monitoring plan include the collection of at least four samples (one sample per quarter) over a minimum one-year period. Data generators may sample more frequently than specified, but are expected to provide the results of all monitoring. Only ADEQ-approved monitoring results will be used in the establishment of BWQ. Sampling of lakes may differ, depending on the related hydrology, depth, length, location, and other factors. In all cases, applicants are advised to seek input from ADEQ prior to developing a BWQ sampling plan and/or collecting samples.

All stream samples should be taken when there is a measurable surface flow in the segment at the BWQ sampling location. If environmental conditions prevent achieving the minimum collection requirements, the sampling period should be extended until at least 4 samples are obtained.

Before initiating BWQ sampling for a surface water, a sampling plan should be developed and submitted consistent with the Impaired Waters Rule R18-11-602(A)(2). The sampling plan should address the following elements: experimental design of the sampling project; project goals and objectives; evaluation criteria for data results; background of the sampling project; identification of target conditions (including a discussion of whether any weather, seasonal variations, stream flow, lake level, or site access may affect the project); data quality objectives; types of samples scheduled for collection; sampling frequency; sampling period; sampling locations and rationale for site selection; and a list of field equipment (including tolerance range and any other specifications related to accuracy and precision). Analytical methods for samples collected must comply with R18-11-111, which specifies that:

A person conducting an analysis of a sample taken to determine compliance with a water quality standard shall use an approved analytical method prescribed in 9 A.A.C. 14, Article 6, or an alternative analytical method that is approved by the Director of the Arizona Department of Health Services under R9-16-610(B); and

A test result from a sample taken to determine compliance with a water quality standard is valid only if the sample is analyzed by a laboratory that is licensed by the Arizona Department of Health Services for the analysis performed.

Samples, containers, preservation techniques, holding times, and analysis shall be conducted in accordance with *Guidelines Establishing Test Procedures and Analysis of Pollutants* in 40 CFR Part 136 and performed by a laboratory certified by the Arizona Department of Health Services,

as stipulated above. The use of other validated analytical methodologies may be authorized where such use can be technically justified. Stream flow shall be measured each time BWQ sampling is performed.

Acceptable methods for flow measurement include those described in *Fixed Station Network Procedures Manual for Surface Water Monitoring*, ADEQ, February 16, 2000, or in the U.S. Geologic Survey manual *Techniques of Water Resources Investigations of the United States Geologic Survey* (Chapter A8, Book 3, "Discharge Measurements at Gauging Stations"). Lake level shall be measured each time BWQ sampling is performed using procedures approved by ADEQ Assessment Program.

As noted, ADEQ may consider data for establishing the baseline water quality from a federal or state agency, the regulated entity, the public, or any other source as long as the data: 1) were collected in accordance with an approved quality assurance project plan; 2) were collected using specified assessment or sample collection and analysis protocols; and 3) meet Arizona credible data and data interpretation requirements under R18-11-602 and R18-11-603 if the data are to be used to identify an impaired water or for a TMDL decision.

4.5 PARAMETERS OF CONCERN

Regulated entities that propose a new or expanded activity may be required to generate BWQ data for any parameters of concern associated with the proposed activity. Parameters of concern are those pollutants or parameters reasonably expected to be present in the discharge that have numeric or narrative water quality standards.

In addition to the parameters of concern, regulated entities may also be requested to provide water quality data for parameters necessary to determine the appropriate value range of water quality criteria (e.g., pH, temperature, hardness). If a dissolved metal is a parameter of concern, a regulated entity may also be requested to provide the information necessary to translate the total metal present in the discharge to an instream dissolved concentration. Again, the importance of consultation between BWQ data generators and ADEQ staff prior to BWQ data generation cannot be overstated.

4.6 INTERPRETATION OF DATA AND ESTABLISHMENT OF BWQ

Generators of BWQ data are expected to provide documentation of their adherence to approved or established protocols and certification that the submitted information is accurate and complete. Qualified data will be reviewed upon its availability and ADEQ will determine BWQ for individual water segments and lakes on a parameter-by-parameter basis.

In general, the agency will perform an arithmetic average of all qualified data to determine BWQ for a particular parameter. For datasets that contain only "not detected" analytical results, BWQ may be considered to be zero, provided that the pollutant is anthropogenic in origin, there is no upstream human activity, atmospheric deposition is unlikely, and appropriately sensitive analytical methodologies were employed. Otherwise, the "not detected" analytical results will be treated as follows: if the Method Reporting Limit (MRL) is equal to or less than the applicable water quality criterion, one-half of the detection level will be assigned. If the MRL is greater than the applicable water quality criterion, one-half of the water quality criterion should be assigned. (Note: Per the Impaired Waters Rule R18-11-601: MRL is the laboratory reported value that is the lowest concentration level included on the calibration curve from the analysis of a pollutant and that can be quantified in terms of precision and accuracy.)

Generally, use of *Clean Techniques* is preferred, where appropriate. Data generators should make every effort to use the most sensitive, practical analytical methods available. The use of less

sensitive analytical methods may cause rejection of the dataset. Generally, ADEQ will use the initial BWQ value established for a particular pollutant parameter in a water segment to judge the impact of all subsequent proposals for new or expanded activities involving that parameter. BWQ reassessments may be appropriate if the data used in the original determination is shown to have been negligently or fraudulently generated, or if the water quality of the segment is believed to be significantly improved over that which existed at the time of the original BWQ determination. Affected stakeholders may petition the ADEQ Director to authorize BWQ reassessment under those circumstances.

5 Assessing the Level of Degradation of Proposed Discharges

Applicability of Degradation to the Various Protection Tiers Procedure for Degradation Assessment Calculations to Determine the Significance of Degradation

Antidegradation impact assessments are required for all new and expanded regulated activities requiring ADEQ Individual Permits that have the potential to degrade water quality in Arizona. The assessment procedures described in this chapter do not apply to nonpoint sources of pollution or activities covered under general permits. The procedures vary by the tier level of protection and by the type of surface water. In general, antidegradation reviews for Tier 1 protection and protection of non-perennial waters and canals will focus on meeting applicable water quality criteria and technology based limits (e.g., BAT) end-of-pipe. For parameters with Tier 2 protection levels on perennial waters, the degradation assessment further determines whether or not significant degradation occurs – i.e., whether or not 10 percent or more of the available assimilative capacity for any parameter of concern will be consumed as a result of the proposed activity during critical flow (e.g., 7Q10) conditions. The level of degradation will be assessed from BWQ conditions.

For Tier 3 protection levels, the degradation assessment must determine that no degradation will occur as a result of the proposed activity unless the impacts are temporary. As a general rule of thumb, temporary impacts are defined as impacts of less than six months duration. Temporary impacts on a unique water should be minimized to the maximum extent practicable; Tier 1 protection applies in all cases.

5.1 APPLICABILITY OF DEGRADATION TO THE VARIOUS PROTECTION TIERS

The concept of degradation is relatively simple: any new or expanded regulated activity that results in a lowering of water quality beyond BWQ is considered to degrade water quality. Degradation is not allowed to cause or contribute to impairments that result in the loss of existing uses (i.e., the Tier 1 threshold), and is not allowed at all in unique waters unless it is temporary, as determined by ADEQ (i.e., the Tier 3 threshold).

Degradation may be permitted at the Tier 2 protection levels as long as it is not significant, as described below. Significant degradation may be allowed in waters protected at the Tier 2 level if the applicant – after conducting a review of reasonable less degrading or non-degrading alternatives – demonstrates that:

- ◆ lowering water quality is necessary to accommodate important economic or social development in the area where the water is located;
- ◆ the highest statutory and regulatory requirements for all new and existing point sources are achieved;
- ◆ all cost-effective and reasonable best management practices for nonpoint source control are implemented; and
- ◆ Tier 1 protection is ensured.

Decisions regarding significant degradation of Tier 2 protection levels will only be made after the required alternatives analysis and economic / social benefits justification have been completed, after the technology and BMP criteria are met, and after the intergovernmental coordination and public participation provisions in Chapter 8 have been satisfied. For Tier 2 assessments on perennial waters, determining BWQ, assessing projected impacts, analyzing possible alternatives, and evaluating economic or social benefits, if applicable, must occur prior to issuing an individual permit. Therefore, it is recommended that an applicant discharging into a perennial water meet with ADEQ in a pre-application conference at least two years prior to the anticipated date of AZPDES permit issuance.

5.2 PROCEDURE FOR TIER 2 DEGRADATION ASSESSMENT

The Tier 2 assessment procedures vary by the type of waterbody, as outlined below:

Tier 2 Parameters on Ephemeral Waters, Intermittent Streams, Effluent Dependent Waters, and Canals

The majority of individual AZPDES permit applicants will likely be discharging to an ephemeral or intermittent stream, an effluent dependent water, or canal. Discharges in these cases will be required to meet water quality criteria end-of-pipe and technology-based standards, e.g., best available technologies (BAT).

Tier 2 Parameters on Perennial Waterbodies

All other individually permitted activities proposing to discharge to waters with Tier 2 parameters of concern must conduct an antidegradation assessment to determine whether or not significant degradation will occur, i.e., whether or not 10 percent or more of the available assimilative capacity for any parameter of concern will be consumed as a result of the proposed activity during critical flow (e.g., 7Q10) or water level conditions. The 10 percent assimilative capacity consumption allowance is measured from baseline water quality. The Tier 2 degradation assessment is based on three characterizations:

- ◆ BWQ, as determined by data collected pursuant to Chapter 4
- ◆ The flow and pollutant loads resulting from the proposed activity
- ◆ Projected changes in water quality and flow that occur as a result of the proposed activity

The results of the degradation assessment will be used to determine whether the proposed activity will be subject to additional requirements as part of the permit issuance process. As noted in the first sections of this chapter, there are a number of factors that must be considered in deliberations concerning whether or not a proposed activity that will degrade water quality is allowable. These factors relate to the water quality protection criteria associated with the various tiers, and include:

- ◆ Calculations to characterize the significance of water quality degradation
- ◆ Analyses of cost-effective and reasonable less degrading or non-degrading alternatives
- ◆ Examination and justification of important activity-related economic or social benefits

The following section addresses the first item noted above. Chapter 6 provides information on analyzing the cost-effectiveness and reasonableness of potential alternatives to the proposed activity; Chapter 7 outlines a procedure for examining and reporting important economic or social benefits that will occur as a result of the proposed activity.

Tier 2 Parameters in Mixing Zones

For new dischargers requesting a mixing zone in a Tier 2 situation, Tier 2 reviews would be needed for pollutants whose effluent concentrations would lower water quality beyond the Tier 2 antidegradation limits. The permitting approach would be the same as the current approach used

for mixing zones: the only change would be that a new section of the mixing zone would be added to reflect the downstream mixing area where the Tier 2 limits would be exceeded (i.e., where mixing zone impacts would meet minimum water quality criteria, but not the Tier 2 antidegradation limit given the baseline water quality in that portion of the receiving water). The Tier 2 review would provide justification for lowering water quality to the Tier 1 level within the affected downstream area of the mixing zone (see Figure 2-1 below), i.e., justification would be needed to lower water quality from Tier 2 BWQ to the Tier 1 level (water quality criteria) downstream of the mixing zone. At some point downstream of the WQC/antidegradation mixing zone, dilution would presumably return the receiving water quality to BWQ (Tier 2 status) in many cases.

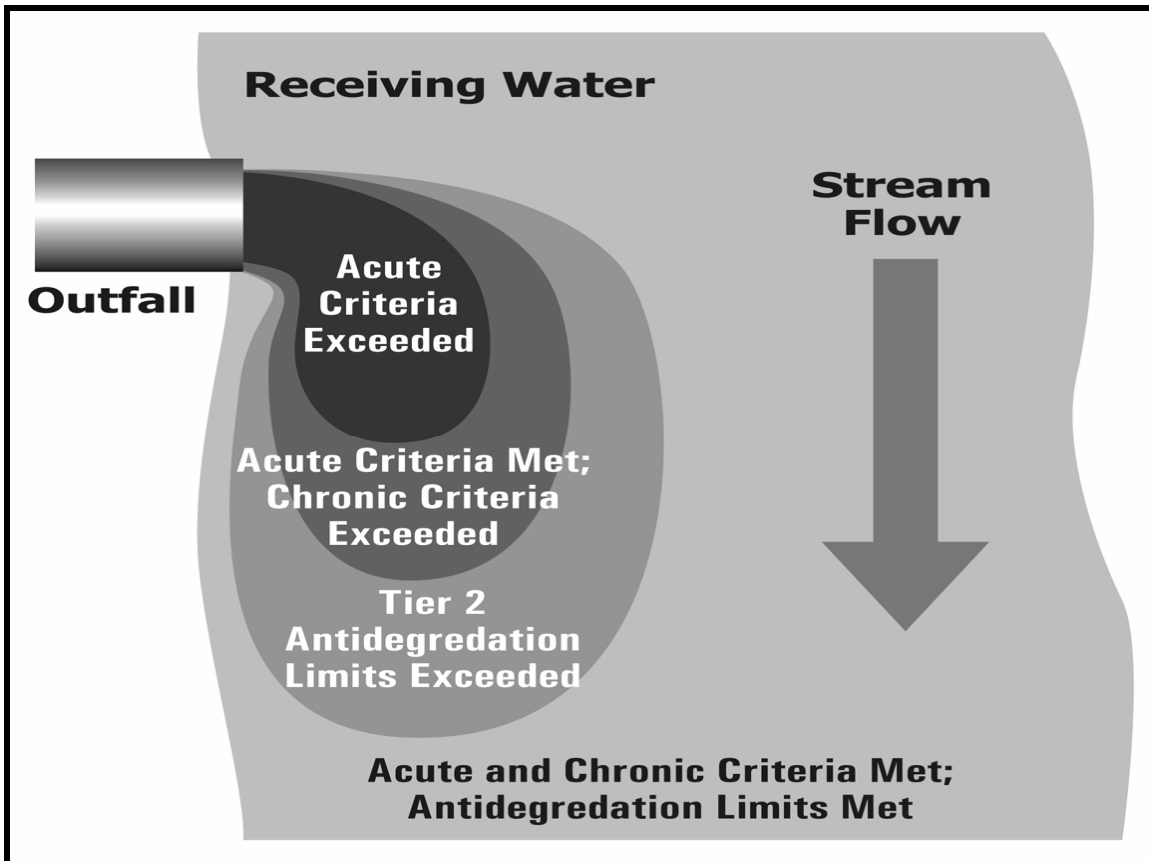


Figure 5-1. Antidegradation Mixing Zone for Receiving Water Protected at the Tier 2 Level

Existing facilities with mixing zones which are applying for permit renewals with no new or expanded discharge would not be required to undergo the Tier 2 review, because their existing effluent is already deemed to compose part of the receiving water's BWQ.

5.3 CALCULATIONS TO DETERMINE SIGNIFICANCE OF DEGRADATION

By definition, at the Tier 2 protection levels BWQ is better than the minimum water quality standards for one or more parameters. The difference between *observed* BWQ and the *required* water quality standard constitutes the available assimilative capacity for any parameter of concern under study. Figure 5-2 below provides a simplified visual representation of available instream assimilative capacity for parameter *x*.

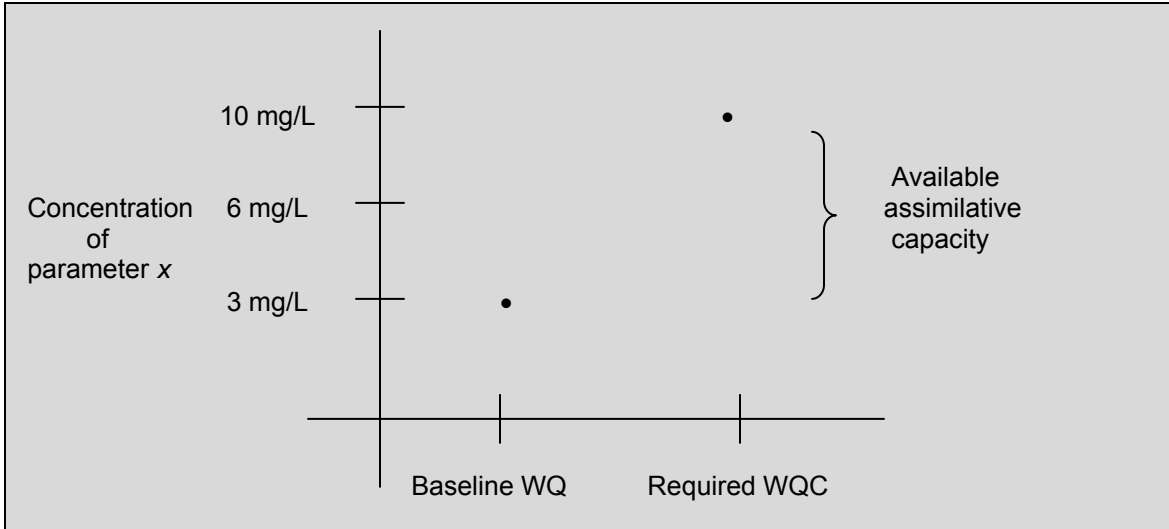


Figure 5-2. Simplified Representation of Waterbody Assimilative Capacity for Parameter *x*

In this example, the applicable water quality standard for parameter *x* is 10 mg/L and the *observed* BWQ measurement is 3 mg/L. The total available assimilative capacity for parameter *x* is the load associated with the difference between the two concentrations at the critical stream flow condition, e.g., an activity that would cause existing (i.e., baseline) water quality concentrations of parameter *x* to increase from 3 mg/L to 10 mg/L would consume all of the total available assimilative capacity of the surface water.

Antidegradation protection requirements for Tier 1 protection levels allow all of the available assimilative capacity to be used. Use of the total available assimilative capacity can also be allowed in Tier 2 protection levels if the alternatives analysis and economic/social justification requirements outlined in Chapters 6 and 7 and the intergovernmental coordination and public participation conditions outlined in Chapter 8 are satisfied.

In Figure 5-2, the total available assimilative capacity is the difference between the required water quality standard for the receiving waterbody segment and observed (i.e., baseline) water quality, or 10 mg/L minus 3 mg/L = 7 mg/L. Ten percent of 7 mg/L is 0.7 mg/L; thus an activity in a Tier 2 situation would be allowable (i.e., not significant) if it did not cause the water quality in the receiving segment to equal or exceed BWQ (i.e., 3 mg/L) plus the significant degradation limit (i.e., 0.7 mg/L), or 3.7 mg/L for parameter *x*.

The calculations noted above are to be executed for critical flow or lake/reservoir water level conditions for the parameters of concern. Critical flow conditions are the lowest flow over 7 consecutive days that has a probability of occurring once every 10 years (7Q10) in the receiving water. Critical lake/reservoir water levels will be determined on a case-by-case basis.

The specific formulas to be used for calculating discharge loads that will or will not result in significant degradation are detailed below.

Calculations for Tier 2 Parameters on Perennial Streams

The calculation to determine a discharge that will result in significant degradation is a variation of the mass balance equation that is used to determine water quality-based discharge limits:

$$(Q_d)(C_d) + (Q_s)(C_s) = (Q_r)(C_r)$$

Where:

Q_d = discharge flow cfs

Q_s = stream flow (7Q10)

Q_r = resulting flow or $Q_s + Q_d$

C_d = discharge concentration,

C_{bwq} = concentration in stream or background water quality

C_r = resultant concentration set equal to $(WQS - C_{bwq})0.1 + C_{bwq}$

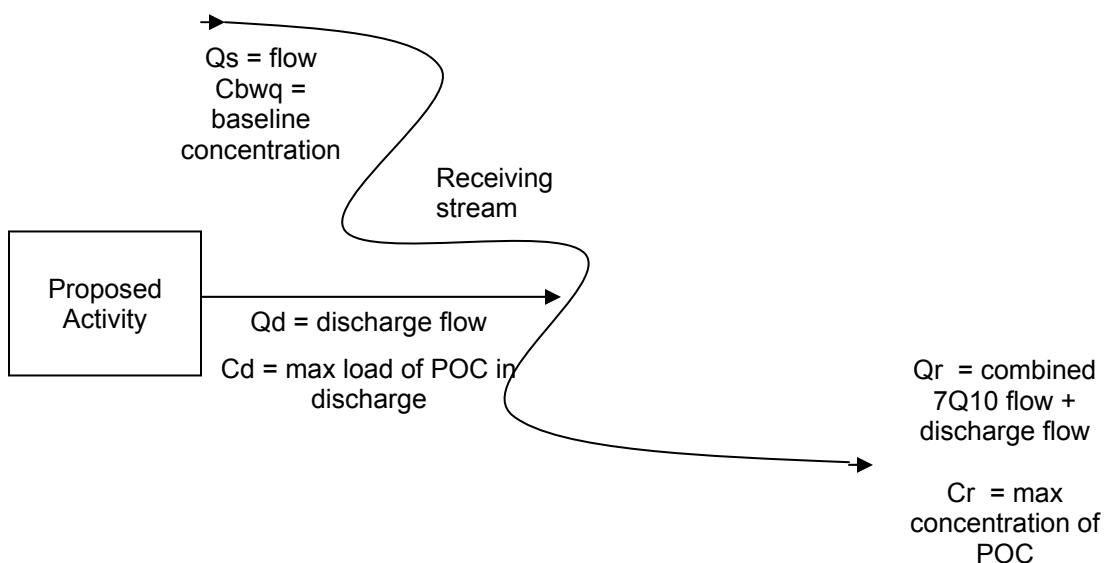
Solve for C_d :

$$C_d = \frac{[C_r(Q_d + Q_s)] - [(C_s)(Q_s)]}{Q_d}$$

For purposes of Tier 2 antidegradation reviews, ADEQ would solve for the discharge concentration that would use up 10% of the assimilative capacity:

$$C_d = \frac{[(WQS - C_{bwq})0.1 + C_{bwq}](Q_d + Q_s) - [(C_s)(Q_s)]}{Q_d}$$

Then compare calculated C_d with the proposed C_d . If the calculated C_d is greater than the proposed C_d then no significant degradation.



It is important to note that the use of the entire Cd load value by one or more discharges would prevent any further loadings of that POC in the stream segment, since all of the allowable assimilative capacity (i.e., 10 percent) would be allocated. An exception could be made in Tier 2 waters if future proposed discharges are deemed socially and economically important (see Chapter 7).

Other Assessment Methods

Other simulative methods, models, or predictive discharge rates may be used for assessing the level of degradation on perennial and intermittent streams, effluent dependent waters, and lakes if approved by ADEQ.

The above formulae will not be used for dissolved oxygen concentrations, since that parameter is handled differently under permitting procedures.

Other parameters not covered by the formulas above include pH, temperature, and fecal coliform.

It is important to note that ADEQ will set limits protective of critical flow (e.g., 7Q10) conditions and will evaluate the permit compliance based on effluent monitoring data. In other words, the permit compliance will be assessed based on the permit limits and effluent data regardless of weather conditions.

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6 Identifying and Evaluating Pollution Control Alternatives for Tier 2 Protection

*Less Degrading and Non-Degrading Pollution Control Measures
Identifying Cost Components and Assessing Costs
Evaluating Environmental Impacts Associated with Alternatives
Cost and Reasonableness Criteria for Alternatives Evaluation
Procedure for Comparing Costs of Various Alternatives
Summary of the Alternatives Analysis Process*

A regulated entity proposing any new or expanded activity that would significantly degrade water quality in a Tier 2 segment (i.e., degrade ambient water quality due to discharge of any bioaccumulative parameters or exceed 10 percent of the remaining assimilative capacity for any other parameters of concern) is required to prepare an evaluation of alternatives to the proposed activity. The evaluation must provide substantive information pertaining to the cost and environmental impacts associated with the proposed activity and the alternatives evaluated. This chapter provides guidance on how to evaluate alternatives to proposed activities affecting water quality protected at the Tier 2 level when an impacts analysis of a proposed activity determines that significant degradation may occur.

The intent of the alternatives analysis is to identify cost-effective and reasonable *less degrading* or *non-degrading* approaches for reducing activity-related impacts so they do not result in significant degradation of the receiving water. An alternatives analysis is also helpful – but not required – to applicants proposing activities in Tier 1 or Tier 3 waters, since a comprehensive review of possible less or non-degrading alternatives might identify cost-effective and reasonable approaches for reducing or eliminating degradation in those waters.

6.1 LESS DEGRADING AND NON-DEGRADING POLLUTION CONTROL MEASURES

For any proposed activity, there may be a number of less degrading and/or non-degrading pollution control measures that might provide cost-effective and reasonable alternatives for preventing the degradation of a surface water. Under Arizona's antidegradation implementation procedures, applicants are required to analyze these alternatives if their proposed activity will cause significant degradation of higher quality (i.e., Tier 2) waters. Less degrading or non-degrading pollution control alternatives identified and assessed during this process should be reliable, demonstrated processes or practices that can be reasonably expected to result in a defined range of treatment or pollutant removal.

If experimental or unproven methods are proposed, ADEQ may request information on previous applications of the method, effectiveness, transferability (if applicable), costs, and other information as appropriate. Applications containing proposals for new or experimental methods will be required to append information regarding likely performance results and may be approved at the discretion of the Director with the understanding that if the proposed technology does not meet projected pollutant control targets the applicant must adopt conventional or other pollution control measures that meet state antidegradation requirements.

Pollution control alternatives to be evaluated when a proposed activity will result in significant degradation of the receiving water segments include, but are not limited to, the following:

- ◆ Examples of Non-Discharge Alternatives
 - Pollution prevention and treatment process changes
 - Recycling/reusing wastewater (i.e., closed loop systems)
 - Holding/transport facilities for treatment/discharge elsewhere
 - Improvements in the collection system to reduce infiltration/inflow
- ◆ Examples of Non-Degrading or Less-Degrading Alternatives
 - Advanced or innovative biological/physical/chemical treatment
 - Pollution prevention and process changes
 - Improvements in the collection system
 - Improved operation and maintenance of existing treatment system
 - Subsurface infiltration (i.e., soil- or media-based treatment)
 - Seasonal or controlled discharges to avoid critical periods
 - Alternative discharge locations
 - Reduction in the scope of the proposed project

Applicants will be expected to address reasonable and cost-effective alternatives, or mix of alternatives in their evaluations, including approaches that are completely different from conventional practice, e.g., land application (subsurface/surface), deep well injection, alternative discharge locations, and other alternatives. ADEQ staff and the applicant will meet to discuss these and other issues early in the process. It is the responsibility of the applicant to screen for and propose a list of available, cost-effective alternatives that will be evaluated in detail. ADEQ may require that additional alternatives be analyzed.

It is recommended that the applicant document any alternatives screened that were determined to be unreasonable or not cost-effective. The intent of the alternatives review process is to ensure that significant degradation does not occur unless no cost-effective, reasonable alternative(s) exist. If the project results in significant degradation even after applying reasonable, cost-effective alternatives, the proposal must demonstrate 1) important social or economic development as outlined in Chapter 8; 2) the level of water quality necessary to protect existing uses is maintained (i.e., Tier 1 protection); 3) all cost-effective and reasonable best management practices for nonpoint source control are implemented; and 4) the highest statutory and regulatory requirements for all new and existing point sources are achieved (R18-11-107 C).

6.2 IDENTIFYING COST COMPONENTS AND ASSESSING COSTS

An assessment of costs related to the alternatives summarized above is necessary to determine whether or not a prospective alternative pollution control measure is reasonable. General cost categories include:

- ◆ Capital costs
- ◆ Operating costs
- ◆ Other costs (one-time costs, savings, opportunity cost, salvage value)

In general, opportunity costs associated with use of a pollution control measure may be included in the cost assessment as appropriate. For example, lost opportunity costs for lots in a proposed subdivision that would be used for spray irrigation rather than housing, or losses related to a process change that results in a missed production run are legitimate and should be documented. Speculative value, i.e., that which is associated with potential future development rather than that associated with an actual proposed project, however, should not be included in cost projections.

In order to develop a standardized framework for projecting, evaluating, and comparing costs associated with various pollution control measures, applicants should use a present worth

framework for generating and reporting cost information. Components of the present worth framework include:

$$P = C + O + [A * (P/A, d, n)] - S - L$$

Where:

- P = Present worth,
- C = Capital cost,
- O = Other costs (expressed as dollars invested at the beginning of the project),
- A = Annual operating cost,
- d = Discount rate,
- n = Useful life in years,
- S = Present worth of salvage value of facilities,
- L = Present worth of salvage value of land, and
- (P/A, d, n) = Equal series present worth factor, $= [(1 + d)^n - 1] / [d (1 + d)^n]$.

The present worth calculated for the alternative technologies depends on the right choice for the discount rate (d), and the useful life (n) of the equipment or facility. Recommended discount rates for Arizona are provided by the US EPA through the state Revolving Fund Loan Program. The useful life of the facility or equipment is based upon similar facilities or equipment handling similar wastes and flows and must be approved by ADEQ. Speculative costs for land, facilities, etc., will not be allowed. For more information on the present worth calculation and other methods that may be used to assess costs, see Appendix B, Direct Cost Comparison of Alternatives.

6.3 EVALUATING ENVIRONMENTAL IMPACTS ASSOCIATED WITH ALTERNATIVES

Pollution control measures evaluated as alternatives to a proposed activity may have environmental impacts that help define their overall value and/or desirability. Applicants are required to provide substantive information pertaining to both the cost and environmental impacts associated with pollution control alternatives evaluated for activities that would significantly degrade Tier 2 level of protection. The information related to environmental impacts should include impacts on the natural environment (i.e., land, air, and water) resulting from implementation of the alternative. The types of impacts evaluated during this process include, but are not limited to:

For all activities:

- ◆ Sensitivity of stream uses
- ◆ Need for low-flow augmentation
- ◆ Sensitivity of groundwater uses in the area
- ◆ Potential to generate secondary water quality impacts (stormwater, hydrology)
- ◆ System or technology reliability, potential for upsets/accidents
- ◆ Effect on endangered species
- ◆ Non-water quality environmental impacts

For all discharges:

- ◆ Nature of pollutants discharged
- ◆ Dilution ratio for pollutants discharged
- ◆ Discharge timing and duration
- ◆ Siting of plant and collection facilities

Review of these impacts might be on a qualitative or quantitative basis, as appropriate. Non-water quality environmental impact analyses to be submitted by the applicant include estimations of the potential impact of the alternative(s) on odor, noise, energy consumption, air emissions, and solid waste generation. Odor and noise may be addressed qualitatively while other non-water quality impacts might need to be addressed quantitatively. The energy use, air emission, and solid waste generation impacts can be expressed as a percent increase/decrease as compared to the proposed activity. Other factors that should be considered during the review include the technical, legal, and local considerations of the various alternatives examined. The schedule and the estimated time of completion of the project should also be provided for each alternative discussed.

6.4 COST AND REASONABLENESS CRITERIA FOR ALTERNATIVES EVALUATION

In general, an alternative or suite of alternatives is considered to be cost-effective and reasonable if it is feasible and the cost is less than 110 percent of the *base costs* of pollution control measures for the proposed activity (present worth costs). It should be noted that the 110 percent cost-effectiveness criterion is a general rule-of-thumb – if pollution control costs for alternatives that would result in substantial water quality benefits slightly exceed the 110 percent cost threshold, those alternatives may be required.

When calculating the cost of a proposed activity and any less- or non-degrading alternatives, it is important to identify the base cost for required pollution control measures for any proposed activity. The base cost for AZPDES permitted facilities is the cost of treating raw or otherwise untreated wastewater to a level that meets water quality criteria or the cost of meeting federal technology based requirements, whichever is more stringent and legally applicable. The base cost for activities permitted under Section 404 of the Clean Water Act (e.g., wetland fills, mining streambed fills) is the cost of pollution controls that meet minimum Section 404 permit and Section 401 water quality certification requirements. Base cost includes technology based limits or technology required to meet water quality criteria. The base cost – the cost for legally required base pollution control measures – is the starting point for alternatives analysis cost comparisons.

6.5 PROCEDURE FOR COMPARING COSTS OF VARIOUS ALTERNATIVES

Base pollution control measures are those required to treat regulated discharges to technology-based requirements or water quality based limits for Tier 1 protection, as applicable and appropriate. Base pollution control measures are the “floor” from which alternatives or other pollution control/reduction costs will be referenced. The cost of base pollution control measures is important in the antidegradation review process since cost “reasonableness” is one of the tests for requiring adoption of alternatives in cases where degradation will be significant. In reviewing costs for a variety of discharge scenarios, three reference costs can be identified (see Figure 6-1):

- ◆ The cost of treatment that results in no discharges of any parameters of concern (the “no-discharge” cost)
- ◆ The cost of treatment that produces an effluent that results in no significant degradation of the receiving water, i.e., that does not lower water quality due to discharge of any bioaccumulative parameters or consume more than 10 percent of the available assimilative capacity for any other parameter of concern (POC)

- ◆ The cost of treating an effluent to a quality that meets specific effluent/best available technology (BAT) limits or water quality criteria for any/all parameters of concern (i.e., the conceptual minimum Tier 1 requirement)

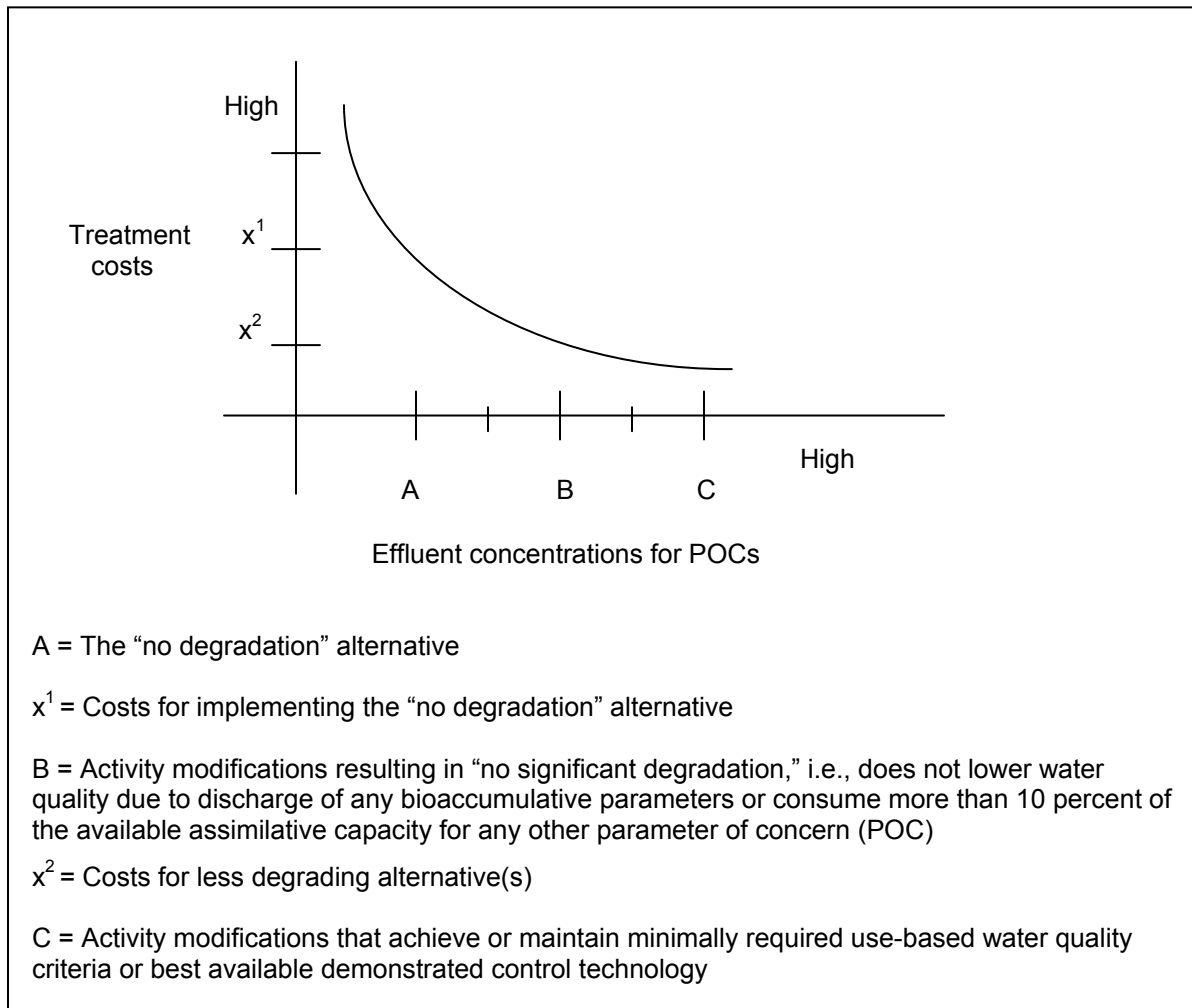


Figure 6-1. Comparison of Treatment Costs to Produce Effluents of Varying Quality

As noted above, the base cost for comparing the reasonableness and cost-effectiveness of less degrading or non-degrading alternatives is the cost of producing an effluent that meets water quality criteria (i.e., Tier 1 protection requirements) or the cost of meeting federally-required effluent concentration limits or best available technology, whichever is more stringent and legally applicable (level C in Figure 6-1). For other regulated activities, the base cost is the cost of meeting technology-based limits required to meet water quality criteria, or the management practices required as part of permitting or certification.

Applicants will be required to submit cost information to ADEQ for base pollution control measures as defined above and alternative pollution control measures that would result in no significant degradation (level B), and any available alternatives to the original proposal. ADEQ may request cost or other information regarding preventing degradation (level A). ADEQ will assess the limitations of the alternatives analysis and may request additional analyses or information, as needed, to make a determination.

6.6 SUMMARY OF THE ALTERNATIVES ANALYSIS PROCESS

The preceding discussion describes the approach that will be followed by ADEQ for determining whether or not less- or non-degrading alternatives to the proposed activity will be required to prevent degradation of Arizona surface waters. The following steps summarize the alternatives analysis process and other relevant actions during antidegradation reviews for Tier 2 protection levels:

- ◆ Based on characterizations of the proposed discharge, baseline water quality (BWQ), and projected impacts on the receiving water segment, ADEQ will determine whether or not the proposed activity will significantly degrade water quality, i.e., lower water quality due to discharge of any bioaccumulative parameters or consume more than 10 percent of the available assimilative capacity for any other parameter of concern (POC).
- ◆ If it is determined that significant degradation would likely occur due to activities proposed by the applicant, an analysis of less degrading or non-degrading alternatives to the proposed activity will be required.
- ◆ The applicant will be required to submit cost information for base pollution control measures associated with the proposed activity, alternative pollution control measures that would result in no significant degradation, and for other less or non-degrading alternatives as appropriate.
- ◆ ADEQ will evaluate the proposed activity, the less and non-degrading alternatives, and the costs and feasibility associated with each mix of options.
- ◆ ADEQ will identify the least degrading alternative – or mix of alternatives – that does not exceed the 110 percent cost threshold (i.e., is cost-effective and reasonable). This will be ADEQ's preferred option.
- ◆ If the preferred option (i.e., pollution control alternative or mix of alternatives) will not result in significant degradation of the receiving water segment, permitting of the activity may proceed. If the preferred option (i.e., pollution control alternative or mix of alternatives) will result in significant degradation of the receiving water segment, the applicant will be required to conduct an analysis of economic and social benefits so ADEQ can determine whether or not the activity can be permitted. In addition to the social and economic importance, in order to permit degradation of a high quality water, the applicant must demonstrate that the proposed activity fully protects existing uses, achieves the highest statutory and regulatory requirements for existing and new point source discharges, and implements cost-effective, reasonable best management practices for nonpoint source control.
- ◆ All water quality impacts in the alternatives analysis will be assessed at the BWQ station and back-calculated to develop the upstream effluent limit (i.e., the assessment of degradation of proposed discharges and of alternatives will be assessed at the BWQ point, while permit limits and permit compliance will be developed and assessed at the discharge point).

7 Determining Social and Economic Importance for Tier 2 Reviews

*Regulatory Requirements for Social and Economic Analysis
Role of the Applicant in Reporting Social and Economic Benefits
Role of DEP in Making a Preliminary Determination of Social and Economic Importance
Role of the Public in Determining Social and Economic Importance
Final Determination*

7.1 REGULATORY REQUIREMENTS FOR SOCIAL AND ECONOMIC ANALYSIS

As discussed in previous chapters, if an alternatives analysis has been conducted for a proposed activity in a Tier 2 protected water, and the least degrading, cost-effective alternative still results in significant degradation, an analysis of the activity's social and economic importance (SEI) must be conducted. Under Arizona's Antidegradation Rule R18-11-107, prior to authorizing any proposed activity that would significantly lower the water quality of a Tier 2 protected water, ADEQ must ensure that allowing lower water quality is necessary to accommodate important social or economic development in the area in which the surface water is located.

There are several steps in determining SEI. First, the applicant conducts an analysis of the social and economic benefits associated with the recommended alternative. The applicant must document any social and economic benefits/detriments associated with the proposed activity and report them to ADEQ. ADEQ then reviews the information and makes a preliminary determination of the social and economic importance of the proposed project. Finally, after public hearing as provided in R18-11-07 C, ADEQ assesses all information and makes a final determination. The following sections detail the roles and procedures for determining SEI.

7.2 ROLE OF THE APPLICANT IN REPORTING SOCIAL AND ECONOMIC BENEFITS

The role of the applicant is to demonstrate the social and economic benefits of the proposed activity associated with allowing significant degradation of high quality water. Due to the need to collect information, analyze impacts, and discuss details of the report both internally and with the applicant, ADEQ recommends that this process begin early. Initiating the social and economic benefits reporting process along with the facility planning and permitting process will ensure that all procedures associated with the antidegradation review are completed promptly and do not unduly delay processing of the permit application.

The report on social and economic benefits (positive and negative) associated with the project is relatively simple and straightforward. ADEQ requires that up-to-date and accurate data are included in the report, and that estimates of job gains/losses, housing impacts, etc., be summarized completely and based on defensible estimates. Using the Social and Economic Importance Worksheet, Appendix C, the applicant must document how the proposed activity affects the social, economic, and environmental factors listed below.

Social, Economic, and Environmental Considerations

Below are the economic and social benefits most commonly associated with this analysis:

1. Creating, expanding or maintaining employment
2. Reducing the unemployment rate
3. Increasing median household income
4. Reducing the number of households below the poverty line
5. Increasing needed housing supply
6. Increasing the community tax base
7. Providing necessary public services (e.g., fire department, school, infrastructure)
8. Correcting a public health, safety, or environmental problem
9. Improving quality of life for residents in the area

Below are the environmental benefits or costs most commonly associated with this analysis:

1. Promoting/impacting fishing, recreation, and tourism industries
2. Enhancing/impacting threatened and endangered species
3. Providing increased flood control and sediment trapping through maintaining or creating wetlands and riparian zones or impacting wetlands and riparian zones
4. Reserving assimilative capacity for future industry and development or reserving no capacity for future discharges.

The applicant may choose to use additional considerations as needed to strengthen its Social and Economic Importance Analysis. Appendix D, *Other Economic and Environmental Considerations*, provides examples of other issues that might be helpful to address in developing an assessment. All information provided shall be based upon the most current, available data (e.g., unemployment statistics, census data, etc.). The applicant must also demonstrate that the proposed activity fully protects existing uses, achieves the highest statutory and regulatory requirements for existing and new point source discharges, and implements cost-effective, reasonable best management practices for nonpoint source control.

7.3 ROLE OF ADEQ IN MAKING A PRELIMINARY DETERMINATION OF SOCIAL AND ECONOMIC IMPORTANCE

Prior to authorizing any proposed activity that would significantly lower the water quality of a Tier 2 protected water, ADEQ shall ensure that the proposed activity is necessary to accommodate important economic or social development in the area in which the waters are located. In making a preliminary decision, ADEQ will rely primarily on the demonstration made by the applicant. However, ADEQ may weigh the applicant's demonstration against counterbalancing socioeconomic costs associated with the proposed activity, such as any anticipated negative socioeconomic effects on the community and the projected environmental effects (i.e., those determined in the alternatives analysis and/or the social and economic importance process). ADEQ will assess all information and make a preliminary determination on the facts on a case-by-case basis.

If information available to ADEQ is not sufficient to make a preliminary determination regarding the socioeconomic importance of the proposed activity, ADEQ may require the project applicant

to submit specific items of information needed to support a determination of importance. The types of information required of the applicant will be determined on a case-by-case basis, but may include: a) information pertaining to current aquatic life, recreational, or other uses of the surface water; b) information necessary to determine the environmental impacts that may result from the proposed activity; c) facts pertaining to the current state of economic development in the area (e.g., population, area employment, major employers, area income, types of businesses); d) governmental fiscal base; and e) land use in the areas surrounding the proposed activity. ADEQ may require use of quantitative models for large proposed activities (e.g., major industrial wastewater treatment facility, large concentrated animal feeding operation, etc.).

Once the available information pertaining to the socioeconomic importance of the proposed activity has been reviewed by ADEQ, a preliminary determination regarding social and economic importance shall be made. If the proposed activity is determined to accommodate important economic or social development in the area in which the affected waters are located, the substance and basis for that preliminary determination shall be documented and the Tier 2 review shall continue. ADEQ shall forward its preliminary determination to selected governmental agencies and make the preliminary determination available to the public. ADEQ shall include a review of social and economic importance issues in the public hearings associated with the project as provided for in state antidegradation regulations (see Chapter 8).

7.4 ROLE OF THE PUBLIC AND INTERGOVERNMENTAL COORDINATION IN DETERMINING SOCIAL AND ECONOMIC IMPORTANCE

The role of the public and selected governmental agencies is to express views and concerns regarding the preliminary ADEQ determination. ADEQ will consider these comments in making its final determination. See Chapter 8, Intergovernmental Coordination and Public Participation, describing how interested parties can participate.

7.5 FINAL DETERMINATION

Once the public hearing requirements are satisfied, ADEQ Director shall make a final determination concerning the social or economic importance of the proposed activity. In addition to the determination of social and economic importance, the Director must find that the proposed activity fully protects existing uses, achieves the highest statutory and regulatory requirements for existing and new point source discharges, and implements cost-effective, reasonable best management practices for nonpoint source control (if applicable). All social and economic importance findings and other required findings, including determinations to deny issuance of a permit for an activity, shall be documented and made part of the public record. ADEQ will assess all information and make a final determination on the facts on a case-by-case basis.

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8 Requirements for Intergovernmental Coordination and Public Participation

*Public Notification Requirements
Opportunities for Public Participation
Intergovernmental Coordination and Review
Appeals of Antidegradation Review Decisions*

The antidegradation review process provides opportunity for public participation. Public notification of review findings, solicitations of public comment, and maintenance of antidegradation review documents as part of the public record help ensure that interested parties can be engaged and involved throughout the process. In addition, intergovernmental coordination and review and a public hearing is required prior to any action that allows a significant lowering of water quality in a surface water afforded Tier 2 protection. This requirement provides an additional level of involvement and input during antidegradation review discussions.

This chapter outlines public participation and intergovernmental coordination and review requirements. It should be noted that the processes for both follow existing state rules regarding public notice, comment, and records. Antidegradation reviews for AZPDES permitted facilities will employ the public participation procedures that are available through the permitting process (e.g., draft permits, fact sheets, opportunities to comment, etc.). The fact sheet will include a discussion for the public of ADEQ's antidegradation review. Appeals of antidegradation review decisions rendered by the Director also adhere to current rules and practice.

8.1 PUBLIC NOTIFICATION REQUIREMENTS

Public notice and opportunity for public comment will be provided for all activities approved after a Tier 1, Tier 2, or Tier 3 antidegradation review. Public notice and opportunity for comment may be combined with other such actions, such as those related to permitting processes or intergovernmental coordination/review procedures.

Activities that may result in a significant degradation of water quality for Tier 2 parameters can only be approved after ADEQ holds a public hearing on whether degradation should be allowed under the general public hearing procedures prescribed at R18-1-401 and R18-1-402 and the Director makes all of the following findings:

- ◆ The level of water quality necessary to protect existing uses is fully protected. Water quality shall not be lowered to a level that does not comply with applicable water quality standards.
- ◆ The highest statutory and regulatory requirements for new and existing point sources are achieved.
- ◆ All cost-effective and reasonable best management practices for nonpoint source pollution control are implemented.
- ◆ Allowing lower water quality is necessary to accommodate important economic or social development in the area where the surface water is located.

After an antidegradation review has been conducted for an activity that may result in significant degradation of waters protected at the Tier 2 level or an activity covered by an individual permit

that may degrade a Tier 3 water, the public notice will include a notice of availability of:

1) the decision as to whether or not the activity will meet antidegradation requirements; 2) determination of projected impacts on baseline water quality; 3) findings and determinations from the alternatives analysis, when required; 4) the conclusions of any social and economic evaluation of the proposed activity, where necessary; and 5) a description of the surface water that is subject to the antidegradation review.

Any required public notice will be provided through the appropriate legal advertisement in a qualified newspaper with the largest circulation for the county where the activity will occur. The notice will identify the action being considered, list all existing uses identified of the surface water, and call for comments from the public regarding the proposed activity.

All antidegradation review findings shall be documented by ADEQ and made part of the public record. Review documents – including baseline water quality assessments, existing uses, the level of review conducted, alternatives analyses, social/economic studies, impacts analyses, and any decisions or findings – will be made available to the public.

8.2 OPPORTUNITIES FOR PUBLIC PARTICIPATION

Public participation in Arizona's water quality antidegradation program can be broad or specific. Opportunities for broad participation include involvement in the triennial review of the water quality standards program (i.e., use designations, water quality criteria determinations, antidegradation review requirements) and participation in rule development relative to permitting processes. In addition, any interested party may nominate a water segment for protection at the Tier 3 level by following the procedure for consideration outlined under R18-11-112 (see Chapter 2). Finally, interested groups can conduct volunteer monitoring.

Wherever possible, ADEQ will seek to integrate public participation regarding antidegradation reviews with other public participation or departmental procedures.

Public notice, opportunity for public comment, and opportunity for a public hearing will be provided for all activities approved after a Tier 1, 2, or 3 antidegradation review, as noted above. Public hearings and the collection of public comments on antidegradation reviews related to permit actions will be integrated into the existing hearing and comment provisions of permit processes.

When antidegradation reviews and notices of findings related to such reviews are incorporated into permit hearings or collection of public comments under the permit process, any required notice of the permit hearing or solicitation of comments shall note that elements of the antidegradation review (e.g., decisions, analyses, studies, water quality impacts) are also under consideration. ADEQ public participation processes that may include opportunities for antidegradation review and public involvement include:

- ◆ The permit issuance process for individual or general permits, which must abide by the requirements of A.A.C. Title 18, Chapter 9.
- ◆ Publicly funded POTW permitting, planning, or funding actions, which require public notices, comment opportunities, and meetings as part of the application process and planning requirements.
- ◆ Individual Clean Water Act Section 401 water quality certifications, which specify public participation requirements executed by ADEQ.

Provisions for public participation in antidegradation reviews and related matters are outlined in the state's Continuing Planning Process.

8.3 INTERGOVERNMENTAL COORDINATION AND REVIEW

Intergovernmental coordination is required prior to approving an activity that would significantly degrade a surface water protected at the Tier 2 level. This requirement seeks to ensure that all relevant public entities at the local, state, and federal levels are aware of any proposal to significantly lower water quality and are provided with an opportunity to review, seek additional information, and comment on the proposal. The intergovernmental coordination and review process occurs prior to the issuance of any final determination on the social and/or economic importance of the proposed activity, and may occur in tandem with public notice procedures outlined in the previous section. The time period afforded to commenting agencies will be consistent with the requirements for submission of public comments.

Intergovernmental coordination requirements will be satisfied by providing a written notice and request for comment to the appropriate agencies listed in Appendix E. Such notice will include summary information on the proposed activity, the receiving water segment, the baseline water quality of the receiving water segment, the tier designation, estimated impacts of the proposed activity upon the receiving waters, the alternatives reviewed, and the projected social or economic importance of the proposed activity. In providing notice to these agencies, staff should note the importance of circulating the notice to local or regional constituents of the agencies involved so that ADEQ receives timely and complete responses from governmental entities that might have information regarding the proposal or might be affected by it.

Comments from the intergovernmental coordination process will be forwarded to the appropriate permit writer or other ADEQ staff for summarization and reporting to management. Once the intergovernmental coordination and public notice requirements outlined above are satisfied, ADEQ shall make a determination concerning the social or economic importance of the proposed activity in the area in which the affected receiving waters are located. All determinations, including determinations to prohibit the activity, shall be documented and made a part of the public record. The state's Continuing Planning Process outlines key elements of the intergovernmental coordination process, including the process for providing notice and collecting comments.

8.4 APPEALS OF ANTIDEGRADATION REVIEW DECISIONS

Final decisions made by the agency (e.g., assignment of protective tier, approval/disapproval notices) after public comment can be appealed to ADEQ. Provisions for appeals are found in the Arizona Administrative Procedures Act, defined at A.A.C. Title 41, Chapter 6, Articles 1-10.

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Appendix A. Antidegradation Review Flow Chart

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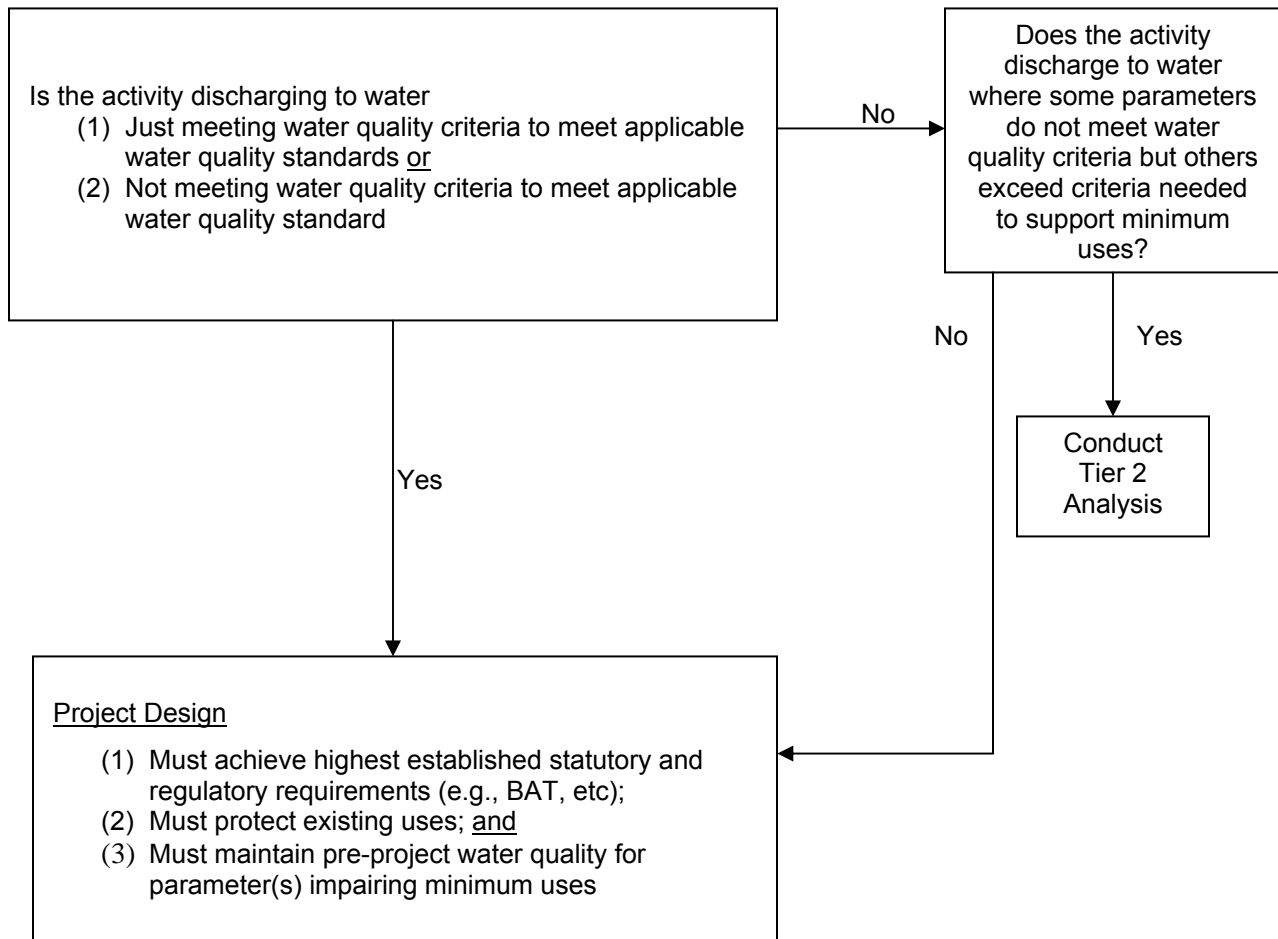
Tier 1

Applies to:

- ◆ All waters (as minimum protection level)
- ◆ 303(d) listed waters
- ◆ All intermittent streams, ephemeral streams, effluent dependent waters, and canals

Level of protection:

- ◆ Existing uses and water quality needed to protect existing uses
- ◆ Where existing water quality does not meet applicable water quality standard, no lowering of water quality is allowed with respect to parameter causing impairment



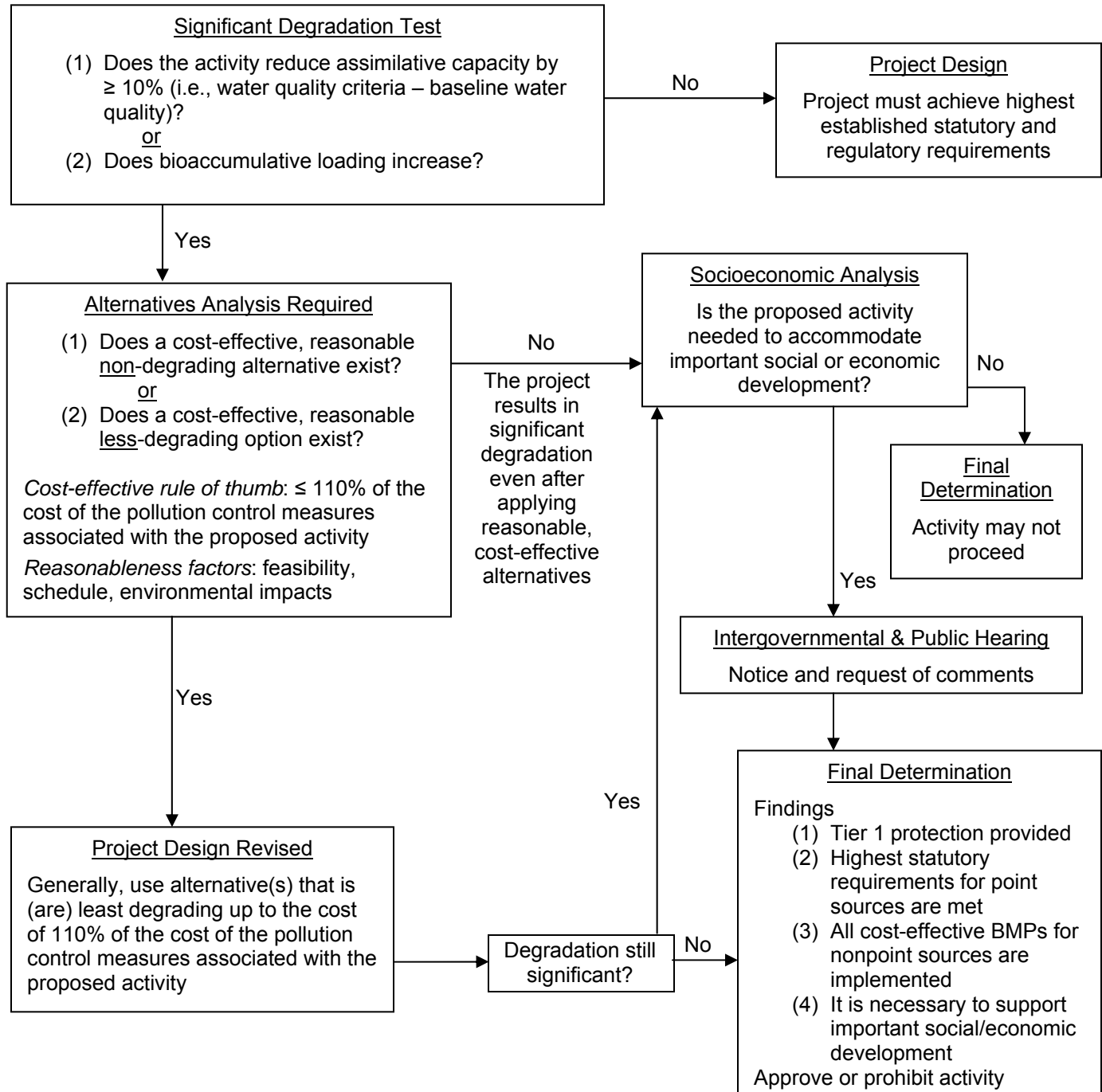
Tier 2

Applies to:

- ◆ High quality perennial waters (water quality is better than the applicable WQSs), lakes, reservoirs

Level of protection:

- ◆ 10% reduction in assimilative capacity allowed as measured from baseline water quality (without requiring alternatives analysis). No increase in loading of bioaccumulative parameters
- ◆ Greater reduction is allowed if justified by socio-economic analysis
- ◆ Protection of existing uses required at a minimum (Tier 1)



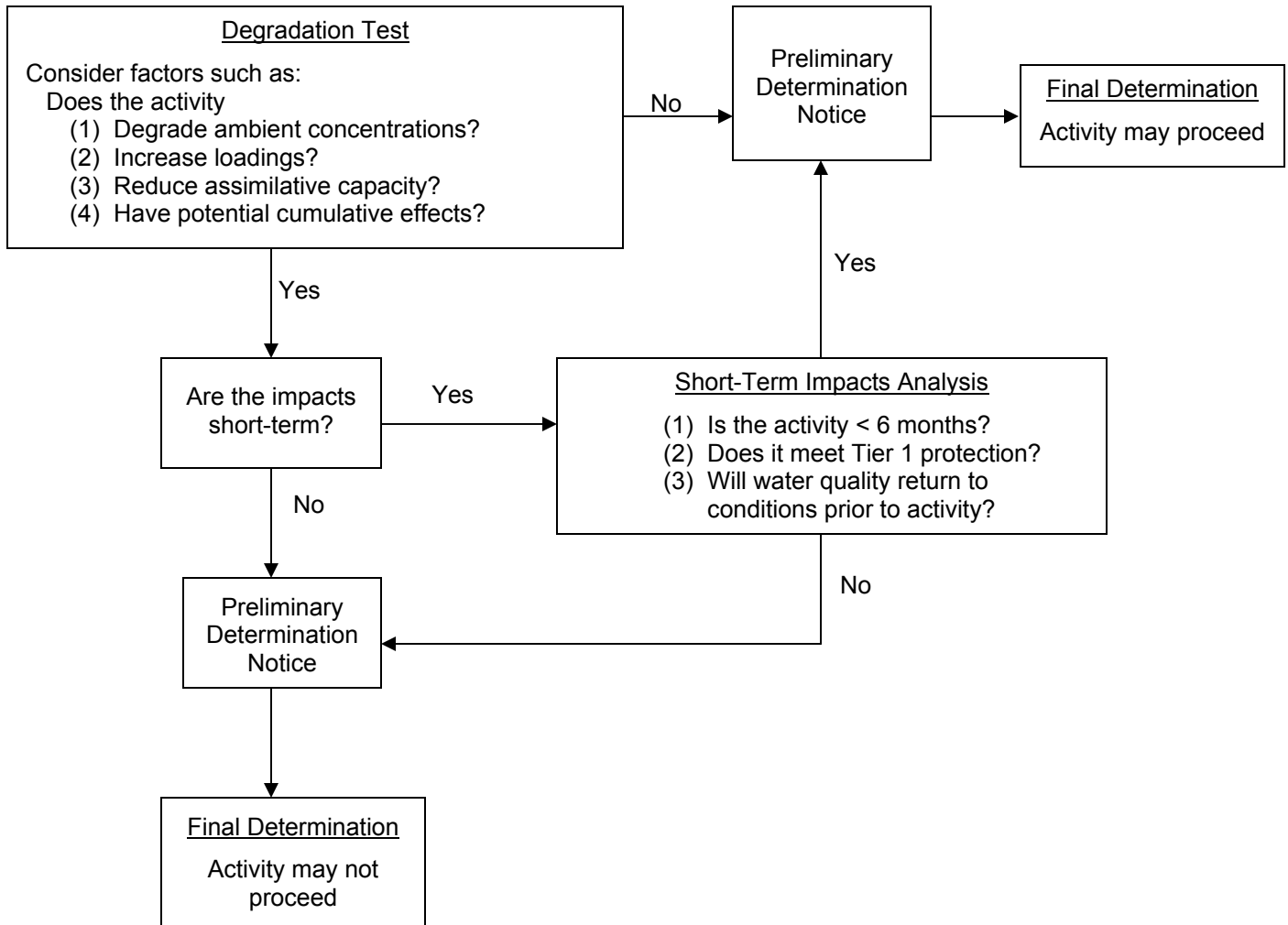
Tier 3

Applies to:

- ◆ Unique Waters

Level of protection:

- ◆ No degradation of water quality allowed except temporary



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Appendix B. Direct Comparison of Alternatives

Direct cost comparisons of alternatives are typically performed on the basis of present worth calculations or calculations of uniform annual cost (if the useful life of each alternative is different), using an applicable interest (discount) rate. The present worth calculation is a well-established method for integrating the upfront capital costs (and associated indebtedness) of a project with its ongoing annual costs of operation, and transforming the integrated costs to one equivalent value. The calculation yields the total equivalent dollars which would have to be invested at the beginning of a project in order to finance it for the life of the facility. The monetary costs considered in the calculations include the total value of the resources, which are attributable to the wastewater treatment, control, and management systems and the component parts. To determine these values, all monies necessary for capital construction costs, operational costs, and maintenance costs should be identified.

Capital construction costs used in cost comparison analysis consist of estimates of the construction costs, including overhead and profit; costs of land (including land purchased for the treatment works site and land used as part of the treatment process or for ultimate disposal of residues), relocation expenses, and right-of-way and easement acquisitions; costs of design engineering, field services (including cost of bond sales); startup costs such as operator training; financing costs and interest during construction; and the costs of any other site-related environmental controls, such as erosion and sediment control practices.

Operational and maintenance costs are usually considered on an annual basis and include operational staff salaries, cost of energy and fuels, cost of treatment chemicals, cost of routine replacement of equipment and equipment parts, and other expenditures necessary to ensure effective and dependable operation over the life of the facility. Annual operation and maintenance costs should be averaged to account for variations, which might occur, year-to-year due to varying production or wastewater volume.

The salvage value of equipment, tankage, and materials from the treatment works is part of the present worth calculation. Salvage value is estimated using straight-line depreciation during the useful life of the project, and can generally only be claimed for equipment where it can be clearly demonstrated that a specific market or re-use opportunity will exist. Salvage value estimation should also take into account the costs of any restoration or decommissioning of treatment units and final disposal costs. It is possible in some cases that these costs may be high enough that the net salvage value will be negative.

Land purchased for the treatment works site is also assumed to have a salvage value at the end of the project useful life equal to its market value at the end of the analysis period. The local inflation rate for land in the use area should be used to project the market value at the end of the analysis period.

It is also important to evaluate any opportunity cost associated with different alternatives. Opportunity costs should not be considered for speculative growth or production increases claimed by an applicant. Any costs claimed should be clearly associated with integral portions of projects, which are realistically available, and are otherwise locally approvable.

The discount rate used in the present worth or uniform annual cost calculation for public sewerage projects should be that rate published by the Arizona Department of Environmental Quality (ADEQ) and associated funding agencies for the planning review and evaluation of water resource projects. The rate is published on an annual basis and is available from ADEQ. For private sector projects, the interest rate utilized should be that rate at which the applicant can borrow funds. Since the present worth calculation is being performed more to compare alternatives rather than to obtain a very accurate estimation of actual costs, the fact that the same

interest rate assumption be utilized for each alternative is more important than the actual interest rate selected.

Cost estimates have an associated level of precision. The cost estimates prepared by the project sponsor should include an estimate of the error for each alternative. The applicant is responsible for documenting and defending all cost estimates used in the analysis.

Cost estimate equations:

The equations below are the basic expressions of the present worth and equivalent annualized cost concepts. Additional mathematical factors and apportionment of costs are incorporated into the equations where appropriate.

- I.** The basic present worth calculation should be performed in accordance with the following equation:

$$P = C + O + [A * (P/A, d, n)] - S - L$$

where,

P = present worth

C = capital cost

A = annual operating costs

(P/A, d, n) = equal series present worth factor $[(1 + d)^n - 1] / [d (1 + d)^n]$

d = discount rate

n = useful life in years

S = present worth of salvage value of facilities

L = present worth of salvage value of land

O = other costs (if any)

A gradient factor may be added into the equations to account for inflation of annual operating costs, as opposed to using an average value throughout the project life, by simply adding the additional following term onto the right hand side of the above equation:

$$[G * (P/G, d, n)]$$

where,

G = uniform increase in annual costs

(P/G, d, n) = present worth factor for a gradient =

$\{(1 - nd) [(1 + d)^n - 1] / [d^2 * (1 + d)^n]\}$.

- II.** If the alternatives have different useful lives, the cost comparison may be performed using the Equivalent Uniform Annual Cost Method. The equation for this method is:

$$EUA = (C + O) * (A/P, d, n) + A - [(S + L) * (A/F, d, n)]$$

where,

EUA = equivalent uniform annual cost

(A/P, d, n) = capital recovery factor $[(1 + d)^n - 1] / [d (1 + d)^n]$

(A/F, d, n) = uniform series sinking fund factor $d / [(1 + d)^n - 1]$

To add a gradient factor, the following additional term is simply added to the right hand side of the above equation:

$$[G * (A/G, d, n)]$$

where,

$$(A/G,d,n) = \text{EUA factor for a gradient} = [(1 + d)^n - 1 - nd] / d * [(1 + d)^n - 1].$$

Additional cost factors:

Other costs, such as opportunity costs, while presented above as one-time present losses, may also have an annual lost revenue component, which could be accounted for by apportioning the costs as both upfront and annual costs.

In general, it is the responsibility of the applicant for a permit or approval to prepare detailed cost estimates for all appropriate and approvable discharge, nondischarge, and combination discharge/nondischarge alternatives. The cost estimates may be prepared by a licensed professional engineer, accountant, economist or other professional qualified in the field, but they must be submitted under a professional engineer seal as part of the permit application.

The sources and rationale for all data and assumptions must be clearly indicated. ADEQ will review the cost estimates for completeness, accuracy, and validity of assumptions. Where deficiencies are discovered, ADEQ will either request additional information or obtain the information on its own, or both. Following the review process, ADEQ will advise the applicant on which alternatives (or combination discharge/nondischarge alternatives) are cost-effective, and processing of a permit application will proceed on that basis. In general, an alternative or suite of alternatives is considered to be cost-effective and reasonable if it is feasible and the cost is less than 110 percent of the base costs of pollution control measures for the proposed activity (present worth costs).

Other factors:

While the basic concept behind the direct comparison is the present worth method, which has traditionally been used, other approaches and factors may be proposed by applicants and will be considered by the Department.

US EPA's Water Quality Standards Handbook – "Interim Economic Guidance for Water Quality Standards," EPA-823-B-95-002 (1995) presents an approach which looks at the absolute value of the alternative rather than at comparisons. The approach separates projects into two basic types: publicly and privately financed. The approach assumes that publicly financed projects provide a public service by a non-profit public entity, and that privately financed projects are proposed by persons or private-sector entities which require certain profit margins to stay in business.

For public proposals, which are being financed directly by public ratepayers or taxes, the criterion for cost-effectiveness in the EPA manual is the affordability of the project to the ratepayers. If the alternative is affordable, regardless of its relative cost compared to other alternatives, it is cost-effective and must be implemented. The actual criterion for affordability is outlined in the manual. It suggests 1 percent of the median household income of the rate paying public as a first screening for presumptive affordability. When projected annual rates are higher than 1 percent of the median income, secondary tests of affordability, including debt indicators (like bond ratings), socioeconomic indicators (like unemployment rate), and community financial management indicators (like property tax revenue collection rate) are factored into the determination. Criteria for these secondary tests are applied in a "scored" matrix.

For private-sector proposals, the approach measures the impact which a nondischarge alternative would have upon profit and financial operation of a facility. The primary test estimates how much profits would decline due to the implementation of a nondischarge alternative. While no specific criterion is given, the approach involves comparing the reduced profit level to past operating profit levels shown in the same or similar type developments or industries, and to operating profit levels which would be maintained with utilization of other wastewater disposal alternatives. The

approach implies that where reduction in projected profit level is small compared to industry standard or other alternatives, then the nondischarge alternative is deemed to be cost-effective. The secondary tests described in the EPA manual involve more complicated financial factors including liquidity, solvency, and leverage. As with the profitability test, no specific criteria are given for these financial elements, other than their utility as subjective evaluation measures of a private-sector facility's financial status.

Combined approach:

Aspects of the EPA evaluation concept can be integrated or combined with the direct comparison approach. For instance, in the evaluation of a public project, the 1 percent of median household income user-fee criteria can be applied as a first test of cost-effectiveness, even before the direct cost comparisons are considered. Only if the user-fees exceed the screening criteria would the direct comparison of the alternative come into play. Likewise, for the private-sector projects, a primary screening test can be added to evaluate profit level. The test would require private developers or businesses to submit an analysis, which estimated the profit levels resulting from the use of each alternative, and compared these to each other and to typical profit levels for the nature of the activity or business proposed. Only if a reduction in profits were deemed to be significant would the direct comparison of alternative costs be considered.

Where appropriate, ADEQ may require that the submitted demonstration of cost-effectiveness include information to support both a primary screening/affordability evaluation as well as a secondary alternative-to-alternative cost comparison.

Appendix C. Social and Economic Importance Worksheet

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SOCIAL & ECONOMIC WORKSHEET

Social and Economic Benefits

Does your proposed activity:

1. Create or expand employment?

Yes _____ Describe _____

No _____ Describe _____

Don't Know _____

Not Applicable _____

2. Reduce the unemployment rate?

Yes _____ Describe _____

No _____ Describe _____

Don't Know _____

Not Applicable _____

3. Increase median family income?

Yes _____ Describe _____

No _____ Describe _____

Don't Know _____

Not Applicable _____

4. Reduce the number of households below the poverty line?

Yes _____ Describe _____

No _____ Describe _____

Don't Know _____

Not Applicable _____

5. Increase needed housing supply?

Yes _____ Describe _____

No _____ Describe _____

Don't Know _____

Not Applicable _____

6. Increase the community tax base?

Yes _____ Describe _____

No _____ Describe _____

Don't Know _____

Not Applicable _____

7. Provide necessary public services (e.g., fire department, school, infrastructure)?

Yes _____ Describe _____

No _____ Describe _____

Don't Know _____

Not Applicable _____

8. Correct a public health or environmental problem?

Yes _____ Describe _____

No _____ Describe _____

Don't Know _____

Not Applicable _____

9. Improve quality of life for residents in the area?

Yes _____ Describe _____

No _____ Describe _____

Don't Know _____

Not Applicable _____

Environmental Protection Benefits

Explain how your proposed activity positively or negatively affects the following:

1. The societal and economic benefits of better health protection.

Describe _____

Don't Know _____

Not Applicable _____

2. Fishing, recreation, and tourism industries.

Describe _____

Don't Know _____

Not Applicable _____

3. The general societal value of maintaining the quality of the environment.

Describe _____

Don't Know _____

Not Applicable _____

4. Threatened and endangered species.

Describe _____

Don't Know _____

Not Applicable _____

5. Increased flood control and sediment trapping through maintaining wetlands and riparian zones.

Describe _____

Don't Know _____

Not Applicable _____

6. Reservation of assimilative capacity for future industry and development.

Describe _____

Don't Know _____

Not Applicable _____

If you would like to address other considerations in your social and economic justification assessment, please attach an additional sheet to this form. For possible considerations, please refer to Appendix D.

Appendix D. Summary of Other Economic and Environmental Impact Categories

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1. Public Need/Social Service

Health/Nursing Care
Police/Fire Protection
Infrastructure Need
Education (primary)

2. Consistency with Local Zoning and Planning

Sewage Facility Planning
Zoning Requirements
Land Use Plans
Patterns of Growth/Development

3. Quality of Life

Educational (post-secondary)
Cultural
Recreational

4. Housing

Quantity
Affordability

5. Employment

Number and Type of Jobs Relative to Local Unemployment Rate and Local
Labor Force
State Local Mean Qualified Income

6. Tax Revenues

Tax Revenue Income for Relative to Increased Private Demand for Services
Public and Private Change in Property Value or Tax Status

7. Development Potential

Potential to Spur Increased Growth

8. Sensitivity of Water Use

Presence of Threatened and Endangered Species
Public Water Supply Use
Water Contact Sports

9. Nature of Pollutants

Synthetic
Bioaccumulative
Naturally Occurring

10. Proposed Degree of Change in Water Quality

Available Dilution
Amount of Assimilative Capacity Used

11. Proximity to Wetlands or Floodplain

Presence of Wetlands
Location with Respect to Stream Channel

12. Duration of Discharge

Permanent
Continuous
Short-term

13. Reliability of Treatment Technology

High Tech/Experimental
Energy Intensive
Maintenance Intensive
Natural System
Overall Reliability

14. Compliance Record

Current Violations
Historical Violations
Overall Record

15. Secondary Beneficial Impacts

Groundwater Recharge
Post-Construction Storm Water
Hydromodifications
Thermal Modification
Construction on Previously Undisturbed Lands
Discharge to Previously Undegraded Waters

Appendix E. List of Agencies Involved in Intergovernmental Coordination

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Interagency Coordination for Antidegradation Review

Public participation and interagency coordination will follow R18-9-A907, which deals with public notice for AZPDES Permits. R18-9-A907(A)(3)(a) through (g) requires that a copy of the public notice of the availability of the draft permit (which contains the antidegradation review) be sent to:

- ◆ the AZPDES permit applicant or permittee;
- ◆ any user identified in the permit application of a privately owned treatment works;
- ◆ any affected federal agency, such as EPA Region 9, the U.S. Fish & Wildlife Service and affected federal public land managers (i.e., U.S. Forest Service, BLM, and National Park Service);
- ◆ any affected state agency, such as the Arizona Department of Water Resources, Arizona Game & Fish Department, State Land Department, and Arizona State Parks;
- ◆ any affected tribal agency;
- ◆ any affected local agency, including each applicable county department of health, environmental services or comparable department;
- ◆ any federal and state agencies with jurisdiction over fish, shellfish, and wildlife resources;
- ◆ the Arizona Historic Preservation Office;
- ◆ the U.S. Army Corps of Engineers;
- ◆ any person who requests public notice in writing; and
- ◆ the Secretaria de Medio Ambiente y Recursos Naturales and the U.S. Section of the International Boundary and Water Commission if the discharge is expected to reach Sonora, Mexico.

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